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Proposed Best Demonstrated Available Technology (BDAT) Background Document for Halogenated Aliphatic U-Wastes. Volume 24

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PROPOSED

BEST DEMONSTRATED AVAILABLE TECHNOLOGY (BDAT) BACKGROUND DOCUMENT FOR HALOGENATED ALIPHATIC U-WASTES

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INTRODUCTION

Pursuant to section 3004(m) of the Resource Conservation and Recovery Act (RCRA), enacted by the Hazardous and Solid Waste Amendments (HSWA) on November 8, 1984, the Environmental Protection Agency (EPA) is proposing best demonstrated available technology (BDAT) treatment standards for halogenated aliphatic U-wastes. These wastes are identified in 40 CFR Part 261.33 and listed in Tables 1-1 and 1-2 of this document. Compliance with these BDAT treatment standards when finalized will be a prerequisite for the placement of these wastes in facilities designated as land disposal units according to 40 CFR Part 268. The effective date for finalization of these treatment standards is May 8, 1990.

This background document provides the Agency's technical support and rationale for selecting and developing the proposed treatment standards for halogenated aliphatic U-wastes. Section 2 presents waste-specific information, i.e., the industry affected and waste characterization. Section 3 discusses the applicable and demonstrated technologies used to treat the waste (or similar wastes), and Section 4 summarizes the available performance data, including data on which the treatment standards are based. Section 5 explains EPA's determination of BDAT, while Section 6 discusses the calculation of proposed BDAT treatment standards.

The BDAT program and promulgated methodology are more thoroughly described in two additional documents: Methodology for Developing Best Demonstrated Available Technology (BDAT) Treatment Standards (USEPA 1989c) and Generic Quality Assurance Project Plan for Land Disposal Restrictions Program ("BDAT")(USEPA 1987f). The petition process to be followed in requesting a variance from the BDAT treatment standards is provided in the Methodology document.

If the concentrations of the regulated constituent, as generated or treated, are lower than or equal to the BDAT treatment standard (when finalized) presented in Tables 1-1 and 1-2, then the wastes will not be prohibited from being placed in land disposal units.

Table 1-2 Proposed BDAT Treatment Standards for Halogenated Aliphatic U-Wastes (Wastewaters)

Waste code	Regulated constituent	Maximum for any single grab sample total composition (mg/l)
U044	Chloroform	0.007
U074	cis-1,4-Dichloro-2-butene	0.034
U074	trans-1,4-Dichloro-2-butene	0.034
U076	1,1-Dichloroethane	0.007
U077	1,2-Dichloroethane	0.007
U078	1,1-Dichloroethylene	0.007
U079	trans-1,2-Dichloroethylene	0.007
U080	Methylene chloride	0.037
U083	1,2-Dichloropropane	0.067
U084	cis-1,3-Dichloropropene	0.067
U084	trans-1,3-Dichloropropene	0.067
U131	Hexachlorethane	0.034
U184	Pentachloroethane	0.037
U208	1,1,1,2-Tetrachloroethane	0.007
U209	1,1,2,2-Tetrachloroethane	0.007
U210	Tetrachloroethylene	0.007
U211	Carbon tetrachloride	0.007
U226	1,1,1-Trichloroethane	0.007
U227	1,1,2-Trichloroethane	0.007
U228	Trichloroethylene	0.007
U243	Hexachloropropene	0.047

2. INDUSTRY AFFECTED AND WASTE CHARACTERIZATION

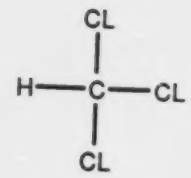
This section describes the industry affected by the land disposal restrictions for the halogenated aliphatic U-wastes and presents available characterization data for these wastes. The halogenated aliphatic U-wastes comprise the following wastes (See Figure 2-1 for the chemical structures for these halogenated aliphatic U-wastes):

Waste Code	Constituent	CAS Number
U044:	Chloroform	67-66-3
U074:	1,4-Dichloro-2-butene	110-57-6
U076:	1,1-Dichloroethane	75-35-3
U077:	1,2-Dichloroethane	107-06-2
U078:	1,1-Dichloroethylene	75-35-4
U079:	1,2-Dichloroethylene	156-60-5
U080:	Methylene chloride	75-09-2
U083:	1,2-Dichloropropane	78-87-5
U084:	1,3-Dichloropropene	10061-02-6
U131:	Hexachloroethane	67-72-1
U184:	Pentachloroethane	76-01-7
U208:	1,1,1,2-Tetrachloroethane	630-20-6
U209:	1,1,2,2-Tetrachloroethane	79-34-5
U210:	Tetrachloroethylene	127-18-4
U211:	Carbon tetrachloride	56-23-5
U226:	1,1,1-Trichloroethane	71-55-6
U227:	1,1,2-Trichloroethane	79-00-5
U228:	Trichloroethylene	79-01-6
U243:	Hexachloropropene	1888-71-7

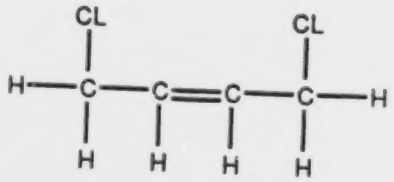
These U-wastes include discarded commercial chemical products, discarded manufacturing chemical intermediates or off-specification commercial chemical products, and spill residues, including contaminated water, soil, or debris, that are identified as toxic wastes. Because of the diversity of methods of waste generation, composition of these wastes varies greatly. The constituents of concern may be present at concentrations varying from several parts per million to nearly the pure product.

Figure 2-1
Chemical Structures for Halogenated Aliphatic U-Wastes

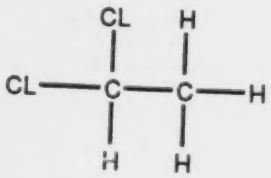
Figure 2-1



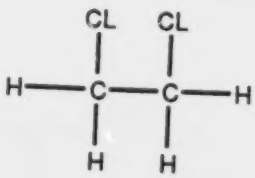
U044: Chloroform



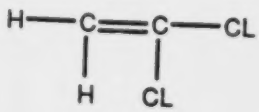
U074: 1,4-Dichloro-2-Butene



U076: 1,1-Dichloroethane

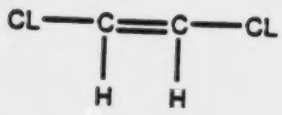


U077: 1,2-Dichloroethane

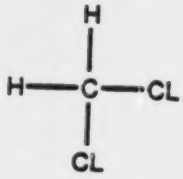


U078: 1,1-Dichloroethylene

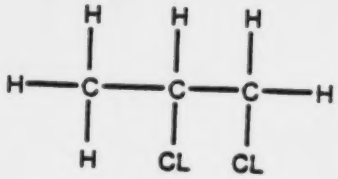
Figure 2-1 (Continued)



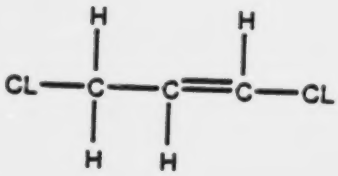
U079: 1,2-Dichloroethylene



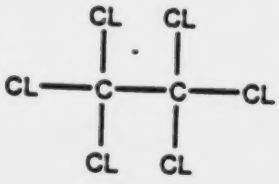
U080: Methylene Chloride



U083: 1,2-Dichloropropane

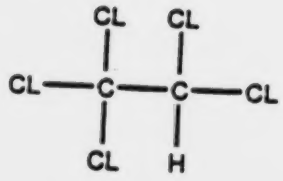


U084: 1,3-Dichloropropene

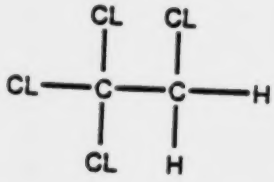


U131: Hexachloroethane

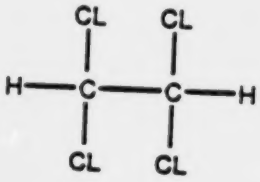
Figure 2-1 (Continued)



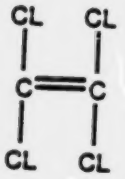
U184: Pentachloroethane



U208: 1,1,1,2-Tetrachloroethane

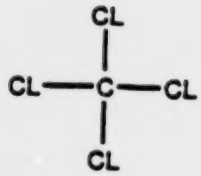


U209: 1,1,2,2-Tetrachloroethane

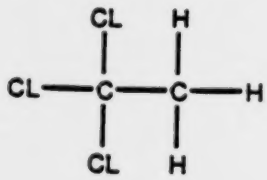


U210: Tetrachloroethylene

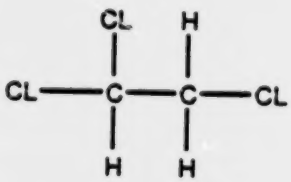
Figure 2-1 (Continued)



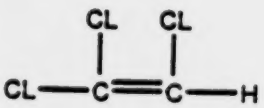
U211: Carbon Tetrachloride



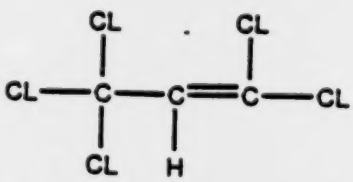
U226: 1,1,1-Trichloroethane



U227: 1,1,2-Trichloroethane



U228: Trichloroethylene



U243: Hexachloropropene

2.1 Industry Affected

Table 2-1 presents a summary of the known domestic manufacturing capacity for the halogenated aliphatic U-wastes. Most of the chemicals in Table 2-1 are used mainly as solvents. Thus the industry principally affected by regulation of halogenated aliphatic U-wastes is the organic chemical manufacturing industry (SIC codes 2865, 2869, and 2899). This indicates that the degree to which an industry is affected is directly related to the degree to which the industry produces and/or uses the halogenated aliphatics.

Table 2-2 gives a summary of major uses for each halogenated aliphatic hydrocarbon. Several of the halogenated aliphatics in Table 2-1, e.g., chloroform, hexachloroethane, trichloroethylene, and methylene chloride, are solvents as well as cleaning agents. One or more of these solvents are used to some degree in virtually every manufacturing industry.

The Agency recently carried out a survey of RCRA Treatment, Storage, Disposal, and Recycling (TSDR) facilities regarding hazardous waste managed by the facilities in 1986. Data obtained in the survey are still being edited and analyzed. Information about 1986 volumes of halogenated aliphatic U-wastes has been extracted from the survey data base and is presented in Table 2-3. Table 2-5 identifies facilities that may generate halogenated aliphatic U-wastes. Because of the nature of the survey, the Agency believes it is likely that the actual 1986 volumes of halogenated aliphatic U-wastes may be understated in Table 2-3. The volumes shown in Table 2-3 are given in gallons; however, this should not be construed to mean that the hazardous wastes are necessarily in liquid form. The concentrations of the halogenated aliphatic U-wastes shown in Table 2-3 are not known, except that they are greater than zero.

2.2 Waste Characterization

Because of the extremely varied and numerous uses for the halogenated aliphatics and because of the many ways that they may become hazardous wastes, characterization of halogenated aliphatic U-wastes is impractical. In general, except for hexachloroethane, pentachloroethane, and hexachloropropene, which are semivolatiles, the compounds in this group are volatiles.

Table 2-4 lists the bond dissociation energy, boiling point, molecular weight, empirical formula, and solubility in water for each halogenated aliphatic U-waste. There are many similarities among the halogenated aliphatics listed in Table 2-4. These compounds are open chain, consisting of up to four carbons; their molecules are composed solely of carbon, hydrogen, and chlorine, with the exception of carbon tetrachloride, tetrachloroethylene, and hexachloroethane, which are composed solely of carbon and chlorine. Eleven of the nineteen halogenated aliphatic compounds have boiling points near or below that of water.

2.3 Treatability Group

Because of the similarities in the physical and chemical properties among these U-wastes, the Agency has categorized them as a single treatability group identified as halogenated aliphatics. That is, EPA believes that these wastes can be treated by the same technology to similar levels in the residue.

Table 2-1 1988 Domestic Manufacturing Capacity for Halogenated Hydrocarbons

Waste Code	Name	Number of manufacturers	Capacity (thousand ton/yr)
U044	Chloroform	5	240
U074	1,4-Dichloro-2-butene	NA	NA
U076	1,1-Dichloroethane	NA	NA
U077	1,2-Dichloroethane	10	8719
U078	1,1-Dichloroethylene	2	NA
U079	1,2-Dichloroethylene	2	NA
U080	Methylene chloride	4	329
U083	1,2-Dichloropropane	2	NA
U084	1,3-Dichloropropene	2	NA
U131	Hexachloroethane	NA	NA
U184	Pentachloroethane	NA	NA
U208	1,1,1,2-Tetrachloroethane	1	NA
U209	1,1,2,2-Tetrachloroethane	1	NA
U210	Tetrachloroethylene	4	360
U211	Carbon tetrachloride	5	289
U226	1,1,1-Trichloroethane	3	495
U227	1,1,2-Trichloroethane	2	NA
U228	Trichloroethylene	2	160
U243	Hexachloropropene	NA	NA

NA - data not available
Source: SRI 1988, USITC 1988

Table 2-2 Principal Uses for Halogenated Aliphatic Hydrocarbons

Waste Code	Name	Uses
U044	Chloroform	Solvent for fats, oils, rubber, alkaloids, waxes, resins; as a cleansing agent; in fire extinguishers; in the rubber industry.
U074	1,4-Dichloro-2-butene	Chemical intermediate for hexamethylenediamine and chloroprene; used in Japan to produce 1,4-butanediine by hydrolysis followed by hydrogenation; dichloroprenes are used as nematocides and as intermediates in the manufacture of pesticides.
U076	1,1-Dichloroethane	Intermediate in the production of vinyl chloride and of 1,1,1-trichloroethane by photochlororination.
U077	1,2-Dichloroethane	Solvent for fats, oils, waxes, gums, resins; fumigant.
U078	1,1-Dichloroethylene	Intermediate in production of vinilydene polymer plastics.
U079	1,2-Dichloroethylene	Solvent for fats, phenol, camphor.
U080	Methylene chloride	Solvent for cellulose acetate; degreasing and cleaning fluids; as solvent in food processing.
U083	1,2-Dichloropropane	Oil and fat solvent; in dry cleaning fluids; in degreasing; insecticidal fumigant mixtures.
U084	1,3-Dichloropropene	Oil and fat solvent; in dry cleaning fluids; in degreasing; insecticidal fumigant mixtures.
U131	Hexachloroethane	Solvent; in explosives; as camphor substitute in celluloid; rubber vulcanizing accelerator.
U184	Pentachloroethane	Solvent for oil and grease in metal cleaning; separation of coal from impurities; in dry cleaning but only to a small extent; in soil sterilization; in organic synthesis; solvent for cellulose acetate, certain cellolose ethers, resins and grease; drying agent for timber.

Table 2-2 (continued)

Waste Code	Name	Uses
U208	1,1,1,2-Tetrachloroethane	Nonflammable solvents for fats, oils, waxes, resins, cellulose acetate, rubber, phosphorous, sulfur; in manufacture of paint, varnish, and rust removers. In soil sterilization, and weed killer and insecticide formulations. As an immersion fluid in crystallography; used in the biological laboratory to provide pathological changes in gastrointestinal tract, liver, and kidneys; intermediate in manufacture of trichloroethylene and other halogenated hydrocarbons having two carbon atoms.
U209	1,1,2,2-Tetrachloroethane	Nonflammable solvents for fats, oils, waxes, resins, cellulose acetate, rubber, phosphorous, sulfur; in manufacture of paint, varnish, and rust removers. In soil sterilization and weed killer and insecticide formulations. As an immersion fluid in crystallography; used in biological laboratories to provide pathological changes in gastrointestinal tract, liver, and kidneys; intermediate in manufacture of trichloroethylene and other halogenated hydrocarbons having two carbon atoms.
U210	Tetrachloroethylene	Dry cleaning; degreasing metals; solvent.
U211	Carbon tetrachloride	As fire extinguisher; for cleaning clothing; as an azeotropic drying agent for wet spark plugs in automobiles; as solvents for oils, fats, lacquers, varnishes, rubber, waxes, resins; extracting oil from flowers, seeds; exterminating destructive insects; solvent; starting material in manufacture of many organic compounds.
U226	1,1,1-Trichloroethane	In cold-type metal cleaning, also in cleaning plastic molds.
U227	1,1,2-Trichloroethane	Solvent for fats, waxes, natural resins, alkaloids.
U228	Trichloroethylene	Solvent for fats, waxes, resins, oils, rubber, paints, and varnishes; solvent for cellulose esters and ethers; used for solvent extraction in many industries; used in degreasing, dry cleaning, and manufacture of organic chemicals and pharmaceuticals.

Table 2-2 (continued)

Waste Code	Name	Uses
U243	Hexachloropropene	Solvent; plasticizer, hydraulic fluid; in preparation of uranium tetrachloride; condensation of hexachloropropene with trichloroethylene will produce monochloropentene.

Sources: Merck Index 1983
Encyclopedia of Chemical Technology, 3rd Edition, 1984
National Library of Medicine 1989.

Table 2-3 Estimated Number of Facilities and Volume of Halogenated Aliphatic U-Wastes Handled in 1986

Waste Code	Name	No. of generators	Volume (gal)
U044	Chloroform	38	102,632
U074	1,4-Dichloro-2-butene	1	3,361
U076	1,1-Dichloroethane	1	1
U077	1,2-Dichloroethane	23	9,953,099
U078	1,-Dichloroethylene	1	960
U079	1,2-Dichloroethylene	3	241
U080	Methylene chloride	41	66,331
U083	1,2-Dichloropropane	1	1
U084	1,3-Dichloropropene	2	241
U131	Hexachloroethane	4	241
U184	Pentachloroethane	2	1
U208	1,1,1,2-Tetrachloroethane	1	1
U209	1,1,2,2-Tetrachloroethane	3	2
U210	Tetrachloroethylene	32	340,209
U211	Carbon tetrachloride	33	84,756
U226	1,1,1-Trichloroethane	44	68,614
U227	1,1,2-Trichloroethane	5	2,332,081
U228	Trichloroethylene	39	124,135
U243	Hexachloropropene	1	1

Source: USEPA 1986a.

Table 2-4 Some Physical and Chemical Characteristics of Halogenated Aliphatic Hydrocarbons

Waste Code	Name	Chemical formula	Bond dissociation[b] energy (kcal/mole)	Molecular weight	Boiling[a,c,d] point °C	Solubility[c] in water (mg/l at 25°C)
U044	Chloroform	$CHCl_3$	355	119.39	61-62	9,300
U074	1,4-Dichloro-2-butene	$C_4H_6Cl_2$	1,085	125	154	9,101
U076	1,1-Dichloroethane	$C_2H_4Cl_2$	740	98.97	57	5,500
U077	1,2-Dichloroethane	$C_2H_4Cl_2$	655	98.96	83-84	8,690
U078	1,1-Dichloroethylene	$C_2H_2Cl_2$	515	96.95	31.9	3,200
U079	1,2-Dichloroethylene	$C_2H_2Cl_2$	515	96.95	55	700
U080	Methylene chloride	CH_2Cl_2	370	84.94	41	16,700
U083	1,2-Dichloropropane	$C_3H_6Cl_2$	940	112.99	95-96	2,700
U084	1,3-Dichloropropene	$C_3H_6Cl_2$	800	112.99	120.4	7,000
U131	Hexachloroethane	C_2Cl_6	595	236.74	186.8	50
U184	Pentachloroethane	C_2HCl_5	610	202.31	161-162	500
U208	1,1,1,2-Tetrachloroethane	$C_2H_2Cl_4$	625	167.86	146.5	560
U209	1,1,2,2-Tetrachloroethane	$C_2H_2Cl_4$	625	167.86	146.5	3,000
U210	Tetrachloroethylene	C_2Cl_4	485	165.85	121	100
U211	Carbon tetrachloride	CCl_4	340	153.84	76.7	500
U226	1,1,1-Trichloroethane	$C_2H_3Cl_3$	640	133.42	74.1	950
U227	1,1,2-Trichloroethane	$C_2H_3Cl_3$	640	133.42	113-114	4,500
U228	Trichloroethylene	C_2HCl_3	500	131.40	86.7	1,100
U243	Hexachloropropene	C_3HCl_5	755	248.75	209-210	4.5

Sources:

[a] Windholz 1983.

[b] Sanderson 1971.

[c] Phyical-Chemical Properties and Categorization of RCRA Wastes According to Volatility.

[d] Aldrich-Catalog Handbook of Fine Chemicals.

3160g

Table 2-5 Facilities That May Generate
Halogenated Aliphatic U-Wastes

Waste code	Description	Facility name	State	Quantity generated
U044	Chloroform	Pfizer, Inc.	CT	4T
		Uniroyal Chemical Company, Inc.	CT	1T
		E.I. DuPont Experimental Station	DE	497P
		Allied Signal, Inc.	IL	5G
		3M Company Cordova Chemical	IL	4,290G
		E.I. DuPont	KY	1T
		Dow Chemical Company	LA	2T
		Waters Associates, Inc.	MA	40P
		Clean Harbors of Braintree	MA	340G
		3M Company Chemolite Center	MN	160G
		Resource Recovery Center	MO	1T
		Chevron USA, Inc.	MS	18G
		National Institute of Environmental Health Sciences South	NC	54G
		Burroughs Welcome Company	NC	4T
		Ciba-Geigy Corporation	NJ	1,150G
		Merck and Company	NJ	2T
		Scherring Corporation	NJ	1,105G
		USDOE Brookhaven National Laboratory	NY	4G
		Pennwault Corporation	NY	1T
		Olin Corporation	NY	84,000G
		Buffalo Color Corporation	NY	50G
		USDOE Mount Facility	OH	1G
		GE Aircraft Engine	OH	15G
		Shell Chemical	OH	53G
		Standard Oil Company	OH	3G
		Scott O.M. and Sons Company	OH	15G
		Merck Sharpt and Sohne Div. of Merck	PA	1T
		Merck and Company, Inc.- Merck Chemical Division	PA	2G
		Squibb Pharmaceutical Corporation	PR	34G
		US Navy Charleston Naval Shipyard	SC	2T[a]
		University of Texas Medical Branch	TX	125G
		Union Carbide Corporation	TX	1T
		Hoechst Celanese Corporation	TX	20G
		US Navy Surface Weapons Center	VA	1G
		Allied Fibers Hopewell Plant	VA	1G

Table 2-5 (continued)

Waste code	Description	Facility name	State	Quantity generated
U044	(Continued)	IBM Corporation	VT	26T
		USDOE	WA	3P
		Borg-Warner Chemical, Inc.	WV	70G
U074	1,4-Dichloro-2-butene	E.I. DuPont Experimental Station	DE	2P
		Cecos International, Inc.	TX	14T
		Aldrich Chem. Co., Inc.	WI	1G
U076	1,1-Dichloroethane	Aldrich Chem. Co.	WI	1G
U077	1,2-Dichloroethane	Pfizer, Inc.	CT	6T
		E.I. DuPont Experimental Station	DE	9P
		Argonne National Laboratory	IL	15G
		Monsanto Company	LA	39,977T
		Borden Chemical	LA	9T
		Olin Corporation Lake Charles	LA	192T
		Dow Chemical Company	LA	44T
		Union Carbide Corporation	LA	9T
		Shell Oil Company	LA	1,122T
		Resource Recovery Center	MD	1T
		Burroughs Welcome Company	NC	2T
		USDOE Brookhaven National Laboratory	NY	2G
		Standard Oil Co.	OH	6G
		Oregon Regional	OR	2G
		US Army New Cumberland	PA	4G
		Fisher Scientific Company	PA	1T
		Squibb Pharmaceutical Company	PR	2G
		US Navy Charleston Naval Shipyard	SC	2T[a]
		Dow Chemical Company	TX	4T
		Shell Oil Company	TX	96T
		Intercontinental Terminals	TX	1T
		Aldrich Chem. Co.	WI	27G
		Union Carbide	WV	1T
U078	1,1-Dichloroethylene	Dow Chemical Company	MI	4T
U079	1,2-Dichloroethylene	E.I. DuPont Experimental Station	DE	1P
		Resource Recovery Center	MD	1T
		Aldrich Chem. Co.	WI	1G

Table 2-5 (continued)

Waste code	Description	Facility name	State	Quantity generated
U080	Methylene chloride	Ciba-Geigy Corp.	AL	5T
		EECO, Inc.	CA	475G
		Morton Thiokol, Inc.	CA	80G
		Great Western Chemical	CA	55G
		American Cyanamid	CT	3T
		E.I. DuPont Experimental Station	DE	18P
		NASA John F. Kennedy Space Center	FL	1T
		Uniroyal Plastics Company	IN	20G
		U.S. Army Lexington-Blue Grass Depot	KY	55G
		Ciba-Geigy Corp.	LA	1T
		ICI Americas	MA	1T
		Clean Harbors of Braintree	MA	525G
		U.S. Army Shed	MD	0.5T
		Parker Chemicals	MI	5T
		3M Company	MN	1T
		Unisys	MN	55G
		Monsanto J.F. Queeny Plant	MO	1T
		University of Missouri	MO	7G
		Marine Corp. Air Station, Cherry Point	NC	1T
		National Institute Environmental Health Sciences South	NC	10G
		Union Carbide	NJ	9T
		ITT	NJ	1T
		U.S. Army Hawthorne Army Ammunition	NV	1T
		USDOE Brookhaven National Laboratory	NY	2G
		FMC Corp.	NY	3T
		Standard Oil Company	OH	10G
		GMC Marine Engine Plant	OH	10G
		Scott CM and Sons	OH	13G
		U.S. Army Letterkenny Army Depot	PA	1T
		Rohm & Haas Del Val, Inc.	PA	1T
		E.I. DuPont de Nemours & Company	PA	2T[a]
		Squibb Pharmaceutical Complex	PR	340G
		U.S. Navy Charleston Naval Shipyard	SC	2T[a]
		University of Texas Medical Branch	TX	26G
		E. Systems	TX	17,655G
		Hoechst Celanese Corp.	TX	25G
		Cecos International	TX	50T
		U.S. Navy Norfolk Naval Base	VA	1T
		USDOE	WA	49P
		LCP Chemical Corp.	WV	78T
		Union Carbide	WV	1T

Table 2-5 (continued)

Waste code	Description	Facility name	State	Quantity generated
U083	1,2-Dichloropropane	Aldrich Chemical Company	WI	1G
U084	1,3-Dichloropropene	Dow Chemical Company	TX	1T
		Aldrich Chem. Co.	WI	1G
U131	Hexachloroethane	E.I. DuPont	DE	3P
		Resource Recovery Center	MO	1T
		Bela Park Facility	OH	1P
		Aldrich Chem. Co., Inc.	WI	1G
U184	Pentachloroethane	University of Rochester	NY	2P
		Aldrich Chemical Co., Inc.		
U208	1,1,1,2-Tetrachloroethane	Aldrich Chemical Company	WI	1G
U209	1,1,2,2-Tetrachloroethane	E.I. DuPont Experimental Station	DE	2P
		USDOE Sandia National Laboratory	NM	1G
U210	Tetrachloroethylene	NASA Marshall Space Flight Center	AL	1,359G
		Robert Shaw Controls	CT	72G
		Hercules, Inc.	DE	12T
		E.I. DuPont Experimental Station	DE	8P
		NASA JFK Space Center	FL	1T
		Argonne National Laboratory	IL	30G
		Robbins Environmental Services	NC	16
		Clean Harbors of Braintree	MA	72G
		USMC Camp Lejuene Marine Corp	NC	1G
		USDOE Sandia National Laboratory	NM	4G
		US Army Hawthorne Army Ammunition	NV	1T
		University of Rochester	NY	1P
		Occidental Chemical Corporation	NY	319T
		IBM Corporation	NY	1T
		Nashua Corporation	NY	1T
		Standard Oil Company	OH	66
		S.K. Wellman Corporation	OH	150G
		U.S. Army Field Artillery Center	OK	80G
		Rohm and Haas del Val	PA	1T
		U.S. Navy Charleston Naval Shipyard	SC	6T
		USMC Air Station Beaufort	SC	2T
		Occidental Chemical Corp.	TX	5T
		Dow Chemical	TX	70T
		Occidental Electro Chemical	TX	869T[a]

Table 2-5 (continued)

Waste code	Description	Facility name	State	Quantity generated
U210	(continued)	US Navy Norfolk Naval Base	VA	1T
		US Navy Surface Weapons Ct	VA	1G
		US Army Fort Belvoir	VA	1T
		USDOE	WA	428P
		PPG Industries	WV	1T
U211	Carbon tetrachloride	TVA National Fertilizer	AL	1G
		University of South Alabama	AL	0.5T
		Great Lakes Chemical Corporation	AR	19T
		University of Arizona	AZ	0.3T
		E.I. DuPont deNemours	CA	5T[a]
		E.I. DuPont Experimental Station	DE	10P
		Argonne National Laboratory	IL	30G
		Southern IL University Poll Cont.	IL	30G
		Penwalt Corporation	KY	43T
		Dow Chemical Company	LA	1T
		Ciba-Geigy	LA	1T
		E.I. DuPont deNemours	MI	7.3T[a]
		Resource Recovery Center	MO	1T
		Chevron USA	MS	8G
		National Institute Environmental Health Sciences South	NC	1G
		USDOE Sandia National Laboratory	NM	23G
		USDOE Brookhaven National Laboratory	NY	1G
		Occidental Chemical Corporation	NY	13T[a]
		Buffalo Color Corporation	NY	100G
		Standard Oil Company	OH	6.5G[a]
		Nela Park Facility	OH	1P
		US Navy Naval Educ.	RI	2G
		US Navy Charleston Naval Shipyard	SC	2T[a]
		E.I. DuPont deNemours	SC	100G
		USDOE Ridge National Laboratory	TN	3G
		Occidental Chemical Corporation	TX	20T
		Dow Chemical Company	TX	48T
		Occidental Electrochem. Corporation	TX	164T
		Hoechst Celanese Corporation	TX	11G
		US Navy Surface Weapons Center	VA	1G
		Lynchburg Foundry Radford Plant	VA	55G
		USDOE	WA	45P
		Aldrich Chem. Corp.	WI	20T[a]

Table 2-5 (continued)

Waste code	Description	Facility name	State	Quantity generated
U226	1,1,1-Trichloroethane	Standard Alaska Products	AK	2T
		Dow Chemical	AR	850G
		USAF Norton AFB	CA	35G
		Aerojet General Corporation	CA	1T
		Northrop Corporation Aircraft Div.	LA	55G
		Exco, Inc.	CA	3,350G
		Morton Thiokol, Inc.	CA	1T
		Hewlett-Packard Company	CA	25T
		USDOE Rocky Flats	CO	12G
		Pervel Ind.	CT	63T
		Chandler Evans, Inc.	CT	4,233G
		E.I. DuPont Experimental Station	DE	24P
		USAF Homestead Air Force Base	FL	34P
		Florida Power & Light Company	FL	1T
		Marathon Petroleum Company	IL	50G
		Morton Thiokol, Inc.	IL	330G
		Pennwalt	KY	54T
		Clean Harbors of Braintree	MA	110G
		US Navy Naval Surface Weapons	MD	1T
		3M Company	MN	1T
		Chevron USA	MS	4G
		National Institute Environmental Health Sciences	NC	1G
		USAF Grand Forks	ND	1T[a]
		Liberty Optical Man.	NJ	110G
		E.I. DuPont deNemours	NJ	52.3T
		USDOE Sandia National Laboratory	NM	2T[a]
		Shell Chemical	OH	29.3T
		PPG Industries	OH	36G
		Standard Oil Company	OH	3G
		Nela Park Facility	OH	2P[a]
		GMC Marine Eng. Div.	OH	440G
		US Army Letterkenny Army Depot	PA	104G
		US Army New Cumberland Army	PA	1T
		PPG Industries	PA	1T
		Boeing Vertol, Inc.	PA	1T
		US Navy Charleston Naval Shipyard	SC	2T[a]
		USMC Air Station Beaufort	SC	1T
		Union Carbide	TX	1T
		Hoechst Celanese Corporation	TX	1G

Table 2-5 (continued)

Waste code	Description	Facility name	State	Quantity generated
U226	(continued)	US Navy Roechst Naval Base	VA	1T
		US Navy Puget Sound Naval	WA	1T
		USDOE	WA	112P
		Aldrich Chem. Co.	WI	1G
U227	1,1,2-Trichloroethane	Standard Alaska Prod.	AK	1T
		E.I. DuPont Experimental Station	DE	3P
		Cecos International .	LA	9,713T[a]
		3M Co.	MN	2T[a]
		Aldrich Chem. Co.		
U228	Trichloroethylene	US Army Fort Wainwright	AK	1G
		U. of South Alabama	AL	1T
		U. of Arizona	AZ	0.5T
		USAF Edwards Air Force	CA	0.2T
		Rockwell International	CA	5T
		Shell Oil Co.	CA	2T
		Coast Western Chemical Co.	CA	110G[a]
		E.I. DuPont Experimental Station	DE	50P
		USDOE	FL	2T[a]
		USAF Robins Air Force Base	GA	55G
		Legion Utensils, Inc.	GA	780G
		USDOE Idaho Nat. Eng. Lab.	ID	85G
		Argonne National Laboratory	IL	55G
		Stanadyne, Inc. Chicago Air	IL	35G
		Uniroyal Plastics Co. Lin.	IN	30G
		US Navy Naval Air St. Paturent River	MD	50G
		Mobay Corp.	MD	55G
		Monsanto JF Queeny Plant	MO	5T
		USAF Columbus Air Force	MS	50G
		National Institute of Environmental Health Science	NC	1G
		FMC Corp.	NJ	1T
		Monsanto Co.	NJ	12T
		USDOE Sandia National Laboratory	NM	3G
		US Army Hawthorne Army Ammunition	NV	1T
		USDOE Brookhaven National Laboratory	NY	85G
		Occidental Chem. Corp.	NY	221-3T
		IBM Corp.	NY	12T
		Nat. Elect. Carbon Corp.	OH	3T
		Merrell Dow Pharmaceuticals	OH	103.5G

Table 2-5 (continued)

Waste code	Description	Facility name	State	Quantity generated
U228	(continued)	Standard Oil Co.	OH	2G
		Sheller - Globe Corp.	OH	1.5T
		US Army New Cumberland Army	PA	1T
		Rockwell International Corp.	PA	200T[a]
		US Navy Charleston Naval Shipyard	SC	20T[a]
		USDOE Ridge National Laboratory	TN	2T
		US Army Lone Star Ammunition Plant	TX	3T
		Dow Chemical Co.	TX	15.5T
		US Army Fort Belvoir	VA	50G
		USDOE	WA	8P
U243	Hexachloropropene	Aldrich Chem. Co.	WI	1G

T = Tons; P = Pounds; G = Gallons

[a] Mixed waste

Source: USEPA 1986a.

3. APPLICABLE AND DEMONSTRATED TREATMENT TECHNOLOGIES

This section identifies the treatment technologies that are applicable to the group of halogenated aliphatic U-wastes and determines which, if any, of the applicable technologies can be considered demonstrated for the purpose of establishing BDAT.

To be applicable, a technology must be theoretically usable to treat the waste in question, or to treat a waste that is similar in terms of the parameters that affect treatment selection. (For detailed descriptions of the technologies applicable for these wastes, or for wastes judged to be similar, see EPA's Treatment Technology Background Document (USEPA 1988q).) To be demonstrated, the technology must be employed in full-scale operation for the treatment of the waste in question or a simi] waste. Technologies that are available only at research facilities or at pilot- and bench-scale operations are not considered in identifying demonstrated technologies.

3.1 Applicable Treatment Technologies

The following subsections present applicable treatment technologies for halogenated aliphatic U-wastes (nonwastewaters and wastewaters).

3.1.1 Nonwastewaters

Since nonwastewater forms of these wastes contain hazardous organic constituents at treatable concentrations, applicable treatment technologies include those that destroy or reduce the total amount of various organic compounds in the waste. The Agency has identified the following treatment technologies as applicable for these wastes: (1) incineration (fluidized bed, rotary kiln, and liquid injection); (2) solvent extraction followed by incineration or recycle of the extract and/or raffinate (residual); (3) critical fluid extraction followed by

incineration; (4) wet air oxidation; (5) chemical oxidation; and (6) distillation. Total recycle or reuse may also be applicable for certain wastes such as off-specification commercial chemical products. These treatment technologies were identified based on current waste treatment practices and engineering judgment.

Application of these technologies is dependent upon the physical and chemical form of the waste. Many of the wastes may be generated in a variety of forms as described in Section 2. For example, a contaminated soil may be amenable to rotary kiln incineration, while an off-specification liquid chemical product may be amenable to solvent extraction.

(1) Incineration. Incineration is a destruction technology in which energy, in the form of heat, is transferred to the waste to destabilize chemical bonds and destroy hazardous organic constituents. In a fluidized bed incinerator, waste is injected into the fluidized bed material (generally sand and/or incinerator ash), where it is heated to its ignition temperature. Heat energy from the combustion reactions is then transferred back to the fluidized bed. Ash is removed periodically during operation and during bed change-outs.

In a rotary kiln incinerator, wastes are fed into the elevated end of the kiln, and the rotation of the kiln mixes the waste with hot gases to heat the waste to its ignition temperature. Ash is removed from the lower end of the kiln. Combustion gases from the kiln enter the afterburner for complete destruction of waste constituents. Other wastes may also be injected into the afterburner.

In a liquid injection incinerator, liquid wastes are atomized and injected into the incinerator. In general, only wastes with low or negligible ash content are amenable to liquid injection incineration.

Therefore, this technology generally does not result in the generation of a significant ash residual.

Combustion gases from most incinerators are then fed to a scrubber system for cooling and removal of entrained particulates and acid gases, if present. In general, with the exception of liquid injection incineration, two residuals are generated by incineration processes: ash and scrubber water.

(2) Solvent extraction. Solvent extraction is a separation technology whereby a contaminant dissolved in a liquid waste is transferred from the waste to an extracting solvent that dissolves that contaminant. For solvent extraction to be effective, the extracting solvent must not be significantly miscible in the waste to be treated and must differ in density so that phase separation is possible. This technology results in the generation of two residuals: a treated waste residual (raffinate) and an extract. The extract and/or raffinate may be recycled or treated by incineration.

(3) Critical fluid extraction. Critical fluid extraction is a solvent extraction technology in which the solvent (which is generally liquified gas at or beyond its critical state) is used to extract hazardous organic constituents from the wastes in the same way as solvent extraction above. After the extraction step, the solvent is brought back to its normal (ambient pressure) condition in the gaseous state, generating a small volume of extract that is concentrated in hazardous organic constituents. This technology results in the generation of two residuals: a treated waste (raffinate) and an extract. The extract may be recycled or treated by incineration. The raffinate can usually be incinerated.

(4) Wet air oxidation. Wet air oxidation is a destruction technology in which hazardous organic constituents in wastes are oxidized and destroyed under pressure at elevated temperatures in the presence of

dissolved oxygen. This technology is applicable for wastes comprised primarily of water and having up to 10 percent total organic concentration. Wet air oxidation results in the formation of one treatment residual: treated effluent. The treated effluent may require further treatment for hazardous organic constituents by biological treatment and/or carbon adsorption or other wastewater treatment technologies.

(5) Chemical oxidation. Chemical oxidation is a treatment technology that may be used to treat wastes containing organics and in some cases to treat sulfide and cyanide wastes. The basic principle of chemical oxidation is that some dissolved organic compounds, inorganic cyanides, and sulfides are chemically oxidized to yield carbon dioxide, water, salts, simple organic acids, and in the case of sulfides, sulfates. The principal chemical oxidants used are hypochlorite, chlorine gas, chlorine dioxide, hydrogen peroxide, ozone, and potassium permanganate.

(6) Distillation. Distillation is the vaporization of one or more volatile components out of liquid solution by the application of heat. Individual components vaporize in order of their volatility so that relatively pure products result upon condensation of the volatilized components. Organic products which were volatilized are typically purified and recovered. Nonvolatile residues of less volatile components remains behind in the distillation vessel bottoms. These bottoms are typically incinerated.

(7) Total recycle or reuse. Total recycle or reuse of a waste in the same process from which it originated, or another process, eliminates the generation of the waste and ideally generates no treatment residuals.

3.1.2 Wastewaters

Since wastewater forms of these wastes contain hazardous organic constituents at treatable concentrations, applicable technologies include those that destroy or reduce the total amount of various organic compounds in the waste. Therefore, the Agency has identified the following treatment technologies as potentially applicable for treatment of these wastes: (1) incineration, (2) wet air oxidation, (3) chemical oxidation, (4) biological treatment, (5) carbon adsorption, (6) solvent extraction, (7) distillation, and (8) steam stripping. Total recycle or reuse may also be applicable for certain wastewaters. These treatment technologies were identified based on current waste treatment practices and engineering judgment.

Application of these technologies is often dependent upon the concentrations and type(s) of waste constituents present in the waste. Carbon adsorption, for example, is often used as a polishing step following primary treatment by biological treatment, solvent extraction, or wet air oxidation. Typically, carbon adsorption is applicable for treatment of wastewaters containing less than 0.1 percent total organic concentration. Typically, wet air oxidation, chemical oxidation, biological treatment, and solvent extraction are applicable for treatment of wastewaters containing up to 1 percent total organic concentration.

(1) Incineration. Incineration of wastewaters is identical to that of nonwastewaters as described previously in Section 3.1.1. EPA believes that incineration may be an applicable wastewater technology for halogenated aliphatic-U-wastes because incineration typically provides significant destruction (even for wastewaters) and that some of these wastewaters may actually contain high concentrations (near 1 percent total organic carbon (TOC)) of carbon. Furthermore, commenters to the

second third proposed rule, indicated that they indeed were incinerating many wastewaters and they did not want to be precluded from doing so where EPA had proposed only carbon adsorption as a method of treatment for wastewater forms of certain U and P organo-phosphorous pesticides.

(2) **Wet air oxidation**. Wet air oxidation of wastewaters is identical to that of nonwastewaters as described previously in Section 3.1.1.

(3) **Chemical oxidation**. Chemical oxidation is identical to that of nonwastewaters as described previously in Sections 3.1.1.

(4) **Biological treatment**. Biological treatment is a technology that uses living microorganisms to decompose organic constituents. Biological treatment can occur either in the presence of oxygen, known as aerobic treatment, or in the absence of oxygen, known as anaerobic treatment. In aerobic treatment the organic constituents are broken down into water, carbon dioxide, and lower molecular weight organic components by the microorganisms. In contrast, in anaerobic treatment the organic constituents are broken down into water, methane and other organic components.

(5) **Carbon adsorption**. Carbon adsorption is a separation technology in which hazardous organic constituents in wastewaters are selectively adsorbed onto activated carbon. This technology results in the formation of two treatment residuals: a treated effluent and spent activated carbon.

(6) **Distillation**. Distillation of wastewater is identical to that of nonwastewaters as described previously in Section 3.1.1

(7) Solvent extraction. Solvent extraction of wastewaters is identical to that of nonwastewaters as described previously in Section 3.1.1.

(8) Steam stripping. Steam stripping is a technology that can separate more volatile materials from less volatile materials by vaporizing the more volatile materials and then condensing them. As such, it is a subset of the type of distillation process.

Total Recycle or Reuse. Total recycle or reuse of wastewaters is identical to that of nonwastewaters as described previously in Section 3.1.1.

3.2 Demonstrated Treatment Technologies

The following subsections present demonstrated treatment technologies for halogenated aliphatic nonwastewaters and wastewaters.

3.2.1 Nonwastewaters

The Agency has identified incineration as a demonstrated technology for treatment of nonwastewater forms of halogenated aliphatic U-wastes. Incineration is demonstrated on a full-scale operational basis for treatment of several of these nonwastewaters as determined from review of the data from many of the treaters of these wastes identified in the 1986 TSDR Survey. For the land disposal restrictions program Third Third scheduled wastes, the Agency tested rotary kiln incineration for treatment of five of these halogenated aliphatic U-wastes (nonwastewater forms), i.e., carbon tetrachloride, methylene chloride, 1,1,1-trichloroethane, hexachloroethane, and tetrachloroethane.

From review of the 1986 TSDR Survey and the USEPA's Water Engineering Research Laboratory data base, the Agency determined that some facilities

also treat nonwastewater forms of these wastes or wastes judged to be similar on a full-scale operational basis using wet air oxidation, chemical oxidation, steam stripping, and distillation; therefore, EPA believes that these technologies are also demonstrated for these wastes.

EPA does not have information on facilities using critical fluid extraction, solvent extraction, and total recycling or reusing these halogenated aliphatic U-wastes, and therefore the Agency believes that these treatment technologies are not currently demonstrated for such wastes.

3.2.2 Wastewaters

From review of the 1986 TSDR Survey and the EPA's Water Engineering Research Laboratory data base, the Agency has determined that some facilities treat wastewater forms of these wastes listed in Table 1-2 using incineration, biological treatment, carbon adsorption, wet air oxidation, chemical oxidation, distillation and steam stripping. Therefore, EPA believes that these technologies are demonstrated (being used on a full-scale basis) for the halogenated aliphatic U-wastes. Since EPA did not identify any facilities using critical fluid extraction, solvent recovery and recycle/reuse, the Agency believes that these technologies are not demonstrated for the halogenated aliphatic U-wastes.

4. PERFORMANCE DATA BASE

This section presents the data available on the performance of the demonstrated technologies in treating the listed wastes (identified in Tables 1-1 and 1-2). These data are used elsewhere in this document for determining which technologies represent BDAT (Section 5) and for developing proposed treatment standards (Section 6). Eligible data may include data developed at research facilities, or through other applications at less than full-scale operation, as long as the technology is demonstrated (as defined in Section 3.2) in full-scale operation for the similar waste or wastes.

Performance data for the halogenated aliphatic-U-wastes include the untreated waste and treated waste concentrations for each constituent found, the values of operating parameters that were measured at the time the waste was being treated, and the values of relevant design parameters for the treatment technology. (However these data are for constituents of concern present in F and K waste treatment performance data and not a U-waste per se.)

Where data are not available on the treatment of the specific wastes of concern, the Agency may elect to transfer performance from the treatment of a similar waste or wastes, using the demonstrated technology. EPA's methodology for the transfer of treatment performance data is provided in EPA's Methodology for Developing BDAT Treatment Standards. To transfer data from another waste category, EPA must find that the wastes covered by this background document are no more difficult to treat (based on the waste characteristics that affect performance of the demonstrated treatment technology) than the treated wastes from which performance data are transferred.

In developing the treatment standards for the 19 halogenated aliphatic-U-wastes, the Agency reviewed the treatability and detection limit data from several different incineration test burns conducted by

EPA for various F and K wastes. These data represent a myriad of different hazardous wastes that were generated and treated at several different incineration facilities. (Detection limits data from these various test burns are included in Appendix A of this background document.)

The Agency determined that there were substantial treatment data for many of the halogenated aliphatic constituents from the incineration of two particular waste codes: K019 (heavy ends from the distillation of ethylene dichloride in ethylene dichloride production); F024 (various wastes from the production of certain halogenated aliphatics such as distillation residues, heavy ends, tars, and reactor clean-out wastes; and also performance data for five of the halogenated aliphatic U-wastes from a June 1989 test burn. Treatment standards for K019 were promulgated in the First Third final rule on August 8, 1988; treatment standards for F024 were promulgated in the Second Third final rule on June 8, 1989. Data from the test burns of F024 and K019 and the June 1989 John Zink pesticides test burn included performance data/detection limits for many of the halogenated aliphatic constituents, ranging from low levels in some wastes to high levels in others. (See Appendix A.) The Agency believes that these treatment data provide a sufficient range of concentration of halogenated aliphatic chemicals in untreated wastes to be considered representative of all halogenated aliphatic U-wastes.

Recently, additional wastewater treatment data primarily from EPA's Office of Water have been analyzed for the development of concentration-based treatment standards for many of the U and P wastes. These data include the treatment of wastewaters that are not specifically listed as U or P wastewaters, but do contain many of the corresponding U or P constituents. While these data were not available in time to incorporate into the preamble discussion or into this background document for halogenated aliphatic U-wastes, these data are being placed in the

administrative record for this third third rulemaking. Furthermore, the Agency has decided to propose alternative concentration-based treatment standards, based on the aforementioned data for all U and P wastewaters for which standards based on incinerator scrubber waters have been proposed. Further information on these alternative standards can be found in sections III.A.2.a.(3) and III.A.1.h.(b.) of the preamble for the proposed rule and in the document "Best Demonstrated Available Technology (BDAT) Background Document for Wastewaters Containing BDAT List Constituents" than can be found in the RCRA docket.

The Agency is also in the process of conducting wastewater treatment tests for selected U and P chemicals using wet air oxidation, powdered activated carbon treatment (PACT), and carbon adsorption. Since much of the currently available wastewater treatment data is from the treatment of relatively low concentrations of U and P constituents in industrial wastewaters, these tests have been designed to examine the applicability of treatment technologies to wastewaters containing relatively high concentrations of U and P constituents. The data developed in these studies will be placed in the administrative record for inspection and comment, when they become available. Further information on the availability of the forthcoming wastewater treatment test data can be found in section III.A.1.h.(6.) of the preamble for the proposed rule.

After review of all the available performance data for the halogenated aliphatic U-wastes treatability group, the Agency decided to use the performance data from the incineration of K019 waste to develop the proposed treatment standards for the halogenated aliphatic U-wastes. EPA's rationale for transferring performance data for the halogenated aliphatic U-wastes from K019 treatment performance data is explained in Section 6-1. Tables 4-1 to 4-12 present the six data sets for the rotary kiln ash and six data sets for the scrubber waters from the K019 treatment performance data used to develop the proposed treatment standards for the halogenated aliphatic U-wastes.

Table 4-1

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - ROTARY KILN INCINERATOR

SAMPLE SET #1

Detected BDAT List Organic Constituents	Untreated Waste: K019 Concentration mg/kg (ppm)	Untreated Waste: RCRA Blend* Concentration mg/kg (ppm)	Treated Waste: Kiln Ash Concentration mg/kg (ppm)
VOLATILES			
4. Benzene	<2,000	2,000	<2
7. Carbon tetrachloride	4,000	<8	<2
9. Chlorobenzene	3,000	<8	<2
14. Chloroform	4,600	<8	<2
22. 1,1-Dichloroethane	2,200	<8	<2
23. 1,2-Dichloroethane	93,000	<8	<2
34. Methyl ethyl ketone	<1,000	940	<10
38. Methylene chloride	<1,000	910	<10
42. Tetrachloroethene	7,300	490	<2
43. Toluene	<200	2,300	<2
45. 1,1,1-Trichloroethane	81,000	130	<2
47. Trichloroethene	3,210	360	<2
215-217. Xylene (total)	<200	3,400	<2
222. Acetone	<1,000	1,200	<10
226. Ethyl benzene	<200	2,200	<2
229. Methyl isobutyl ketone	<1,000	1,100	<10
SEMIVOLATILES			
51. Acenaphthalene	<10	150	<2
57. Anthracene	<10	110	<2
65. Benzo(k)fluoranthene	<10	67	<2
68. Bis(2-chloroethyl) ether	280	<20	<2
70. Bis(2-ethylhexyl) phthalate	<10	40	<2
80. Chrysene	SNA	28	<2
87. o-Dichlorobenzene	<10	250	<2
88. p-Dichlorobenzene	81	32	<2
98. Di-n-butyl phthalate	<10	31	<2
108. Fluoranthene	<10	120	<2
109. Fluorene	20	53	<2
110. Hexachlorobenzene	69	<100	<10

SNA A standard is not available; the compound was searched using an NBS Library database of 42,000 compounds. The compound was not detected.

* Only one sample of RCRA Blend waste was taken. The results are repeated in each sample set.

Table 4-1 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - ROTARY KILN INCINERATOR

SAMPLE SET #1 (Continued)

Detected BDAT List Organic Constituents	Untreated Waste: K019 Concentration mg/kg (ppm)	Untreated Waste: RCRA Blend* Concentration mg/kg (ppm)	Treated Waste: Kiln Ash Concentration mg/kg (ppm)	Treated Waste: Kiln Ash TCLP mg/L (ppm)
SEMIVOLATILES (Continued)				
111. Hexachlorobutadiene	<50	210	<10	
113. Hexachloroethane	120	<100	<10	
121. Naphthalene	470	<20	<2	
126. Nitrobenzene	<25	3,400	<5	
136. Pentachlorobenzene	61	<100	<10	
141. Phenanthrene	21	240	<2	
142. Phenol	<10	78	<2	
145. Pyrene	<10	200	<2	
148. 1,2,4,5-Tetrachlorobenzene	76	<50	<5	
150. 1,2,4-Trichlorobenzene	100	<50	<5	
Detected BDAT List Metal and Inorganic Constituents				
METALS				
154. Antimony	<6.0	24	8.0	<0.060
155. Arsenic	1.2	94	3.6	<0.002
156. Barium	0.97	1.3	26	0.033
158. Cadmium	0.63	<0.3	0.66	<0.003
159. Chromium	4.0	40	44	0.200
160. Copper	2.1	165	2,370	2.690
161. Lead	3.4	27	120	0.380
163. Nickel	3.0	8.8	66	0.680
165. Silver	<0.9	<0.9	3.3	<0.009
167. Vanadium	<2.0	2.2	4.1	<0.020
168. Zinc	5.8	4,170	12	0.052
INORGANICS				
169. Total Cyanide	<0.5	0.9	<0.47	
170. Fluoride	<5.0	31	38	
171. Sulfide	790	830	68	

*Only one sample of RCRA Blend waste was taken. The results are repeated in each sample set.

Table 4-1 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - ROTARY KILN INCINERATOR

SAMPLE SET #1 (Continued)

DESIGN AND OPERATING PARAMETERS

Parameter	Design	Operating Value
Kiln Temperature (^{o}F)	*	1825-1900
Kiln Solids Residence Time (min)	*	120
Waste Feed Rate (MMBTU/hr)	*	K019: 13.1 RCRA Blend, Waste Burner #1: 3.9-5.5 RCRA Blend, Waste Burner #2: 4.4-9.7
Kiln Rotational Speed (RPM)	*	0.19-0.21

*This information has been claimed as RCRA Confidential Business Information. The information is available in the confidential portion of the Administrative Record for this rulemaking.

Table 4-2 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - ROTARY KILN INCINERATOR

SAMPLE SET #2 (Continued)

Detected BDAT List Organic Constituents	Untreated Waste: K019 Concentration mg/kg (ppm)	Untreated Waste: RCRA Blend* Concentration mg/kg (ppm)	Treated Waste: Kiln Ash Concentration mg/kg (ppm)	Treated Waste: Kiln Ash TCLP mg/L (ppm)
SEMIVOLATILES (Continued)				
111. Hexachlorobutadiene	<50	210	<10	
113. Hexachloroethane	85	<100	<10	
121. Naphthalene	314	<20	<2	
126. Nitrobenzene	<25	3,400	<5	
136. Pentachlorobenzene	51	<100	<10	
141. Phenanthrene	15	240	<2	
142. Phenol	<10	78	<2	
145. Pyrene	<10	200	<2	
148. 1,2,4,5-Tetrachlorobenzene	62	<50	<5	
150. 1,2,4-Trichlorobenzene	65	<50	<5	
Detected BDAT List Metal and Inorganic Constituents				
METALS				
154. Antimony	<6.0	24	6.8	<0.060
155. Arsenic	<0.2	94	2.8	<0.002
156. Barium	<0.9	1.3	23	0.036
158. Cadmium	0.46	<0.3	0.96	0.004
159. Chromium	3.4	40	60	0.130
160. Copper	1.7	165	3,430	2.380
161. Lead	2.3	27	42	0.260
163. Nickel	3.6	8.8	89	0.566
165. Silver	<0.9	<0.9	3.4	<0.009
167. Vanadium	<2.0	2.2	4.8	<0.020
168. Zinc	6.9	4,170	13	0.07
INORGANICS				
169. Total Cyanide	<0.5	0.9	<0.47	
170. Fluoride	<5.0	31	5.1	
171. Sulfide	NA	830	<50	

NA Not Analyzed.

*Only one sample of RCRA Blend waste was taken. The results are repeated in each sample set.

Table 4-2 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - ROTARY KILN INCINERATOR

SAMPLE SET #2 (Continued)

DESIGN AND OPERATING PARAMETERS

Parameter	Design	Operating Value
Kiln Temperature (^{o}F)	*	1800-1880
Kiln Solids Residence Time (min)	*	120
Waste Feed Rate (MMBTU/hr)	*	K019: 12.2 RCRA Blend, Waste Burner #1: 5.2-5.5 RCRA Blend, Waste Burner #2: 4.4-9.7
Kiln Rotational Speed (RPM)	*	0.19-0.21

*This information has been claimed as RCRA Confidential Business Information. The information is available in the confidential portion of the Administrative Record for this rulemaking.

Table 4-3

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - ROTARY KILN INCINERATOR

SAMPLE SET #3

Detected BDAT List Organic Constituents	Untreated Waste: K019 Concentration mg/kg (ppm)	Untreated Waste: RCRA Blend* Concentration mg/kg (ppm)	Treated Waste: Kiln Ash Concentration mg/kg (ppm)
VOLATILES			
4. Benzene	<2,000	2,000	<2
7. Carbon tetrachloride	3,500	<8	<2
9. Chlorobenzene	<2,000	<8	<2
14. Chloroform	5,000	<8	<2
22. 1,1-Dichloroethane	<2,000	<8	<2
23. 1,2-Dichloroethane	87,000	<8	<2
34. Methyl ethyl ketone	<10,000	940	<10
38. Methylene chloride	<10,000	910	<10
42. Tetrachloroethene	6,000	490	<2
43. Toluene	<2,000	2,300	<2
45. 1,1,1-Trichloroethane	34,000	130	<2
47. Trichloroethene	2,200	360	<2
215-217. Xylene (total)	<2,000	3,400	<2
222. Acetone	<10,000	1,200	<10
226. Ethyl benzene	<2,000	2,200	<2
229. Methyl isobutyl ketone	<10,000	1,100	<10
SEMIVOLATILES			
51. Acenaphthalene	<10	150	<2
57. Anthracene	<10	110	<2
65. Benzo(k)fluoranthene	<10	67	<2
68. Bis(2-chloroethyl) ether	290	<20	<2
70. Bis(2-ethylhexyl) phthalate	<10	40	<2
80. Chrysene	SNA	28	<2
87. o-Dichlorobenzene	<10	250	<2
88. p-Dichlorobenzene	80	32	<2
98. Di-n-butyl phthalate	<10	31	<2
108. Fluoranthene	<10	120	<2
109. Fluorene	19	53	<2
110. Hexachlorobenzene	73	<100	<10

SNA A standard is not available; the compound was searched using an NBS Library database of 42,000 compounds. The compound was not detected.

* Only one sample of RCRA Blend waste was taken. The results are repeated in each sample set.

Table 4-3 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - ROTARY KILN INCINERATOR

SAMPLE SET #3 (Continued)

Detected BDAT List Organic Constituents	Untreated Waste: K019 Concentration mg/kg (ppm)	Untreated Waste: RCRA Blend* Concentration mg/kg (ppm)	Treated Waste: Kiln Ash Concentration mg/kg (ppm)	Treated Waste: Kiln Ash TCLP mg/L (ppm)
SEMIVOLATILES (Continued)				
111. Hexachlorobutadiene	<50	210	<10	
113. Hexachloroethane	95	<100	<10	
121. Naphthalene	350	<20	<2	
126. Nitrobenzene	<25	3,400	<5	
136. Pentachlorobenzene	59	<100	<10	
141. Phenanthrene	11	240	<2	
142. Phenol	<10	78	<2	
145. Pyrene	<10	200	<2	
148. 1,2,4,5-Tetrachlorobenzene	67	<50	5	
150. 1,2,4-Trichlorobenzene	70	<50	<5	
Detected BDAT List Metal and Inorganic Constituents				
METALS				
154. Antimony	<6.0	24	9.2	<0.060
155. Arsenic	<0.2	94	5.7	<0.002
156. Barium	<0.9	1.3	54	0.057
158. Cadmium	0.53	<0.3	3.6	0.005
159. Chromium	3.5	40	202	0.260
160. Copper	1.7	165	2,290	7.030
161. Lead	3.4	27	118	0.620
163. Nickel	2.3	8.8	169	0.960
165. Silver	<0.9	<0.9	1.9	<0.009
167. Vanadium	<2.0	2.2	6.0	<0.020
168. Zinc	4.4	4,170	16	0.170
INORGANICS				
169. Total Cyanide	<0.5	0.9	<0.47	
170. Fluoride	<5.0	31	6.1	
171. Sulfide	NA	830	64	

NA = Not Analyzed.

* Only one sample of RCRA Blend waste was taken. The results are repeated in each sample set.

Table 4-3 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - ROTARY KILN INCINERATOR

SAMPLE SET #3 (Continued)

DESIGN AND OPERATING PARAMETERS

Parameter	Design	Operating Value
Kiln Temperature (°F)	*	1850-1900
Kiln Solids Residence Time (min)	*	120
Waste Feed Rate (MMBTU/hr)	*	K019: 12.4 RCRA Blend, Waste Burner #1: 5.2-5.8 RCRA Blend, Waste Burner #2: 4.4-8.4
Kiln Rotational Speed (RPM)	*	0.19-0.21

*This information has been claimed as RCRA Confidential Business Information. The information is available in the confidential portion of the Administrative Record for this rulemaking.

Table 4-4

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - ROTARY KILN INCINERATOR

SAMPLE SET #4

Detected BDAT List Organic Constituents	Untreated Waste: K019 Concentration mg/kg (ppm)	Untreated Waste: RCRA Blend* Concentration mg/kg (ppm)	Treated Waste: Kiln Ash Concentration mg/kg (ppm)
VOLATILES			
4. Benzene	<2,000	2,000	<2
7. Carbon tetrachloride	3,900	<8	<2
9. Chlorobenzene	<2,000	<8	<2
14. Chloroform	5,300	<8	<2
22. 1,1-Dichloroethane	<2,000	<8	<2
23. 1,2-Dichloroethane	122,000	<8	<2
34. Methyl ethyl ketone	<10,000	940	<10
38. Methylene chloride	<10,000	910	<10
42. Tetrachloroethene	7,200	490	<2
43. Toluene	<2,000	2,300	<2
45. 1,1,1-Trichloroethane	44,000	130	<2
47. Trichloroethene .	2,300	360	<2
215-217. Xylene (total)	<2,000	3,400	<2
222. Acetone	<10,000	1,200	<10
226. Ethyl benzene	<2,000	2,200	<2
229. Methyl isobutyl ketone	<10,000	1,100	<10
SEMIVOLATILES			
51. Acenaphthalene	<10	150	<2
57. Anthracene	<10	110	<2
65. Benzo(k)fluoranthene	<10	67	<2
68. Bis(2-chloroethyl) ether	310	<20	<2
70. Bis(2-ethylhexyl) phthalate	<10	40	12
80. Chrysene	SNA	28	<2
87. o-Dichlorobenzene	<10	250	<2
88. p-Dichlorobenzene	84	32	<2
98. Di-n-butyl phthalate	<10	31	230
108. Fluoranthene	<10	120	<2
109. Fluorene	21	53	<2
110. Hexachlorobenzene	61	<100	<10

SNA A standard is not available; the compound was searched using an NBS Library database of 42,000 compounds. The compound was not detected.

*Only one sample of RCRA Blend waste was taken. The results are repeated in each sample set.

Table 4-4 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - ROTARY KILN INCINERATOR

SAMPLE SET #4 (Continued)

Detected BDAT List Organic Constituents	Untreated Waste: K019 Concentration mg/kg (ppm)	Untreated Waste: RCRA Blend* Concentration mg/kg (ppm)	Treated Waste: Kiln Ash Concentration mg/kg (ppm)	Treated Waste: Kiln Ash TCLP mg/L (ppm)
SEMIVOLATILES (Continued)				
111. Hexachlorobutadiene	<50	210	<10	
113. Hexachloroethane	94	<100	<10	
121. Naphthalene	360	<20	<2	
126. Nitrobenzene	<25	3,400	<5	
136. Pentachlorobenzene	64	<100	<10	
141. Phenanthrene	19	240	<2	
142. Phenol	<10	78	<2	
145. Pyrene	<10	200	<2	
148. 1,2,4,5-Tetrachlorobenzene	82	<50	<5	
150. 1,2,4-Trichlorobenzene	74	<50	<5	
Detected BDAT List Metal and Inorganic Constituents				
METALS				
154. Antimony	<6.0	24	<6.0	<0.060
155. Arsenic	<0.2	94	5.7	<0.002
156. Barium	<0.9	1.3	8.4	0.036
158. Cadmium	<0.3	<0.3	<0.3	0.005
159. Chromium	1.8	40	28	0.110
160. Copper	<1.0	165	1,270	1.940
161. Lead	2.4	27	25	0.320
163. Nickel	2.2	8.8	69	0.870
165. Silver	<0.9	<0.9	2.6	<0.009
167. Vanadium	<2.0	2.2	<2.0	<0.020
168. Zinc	9.4	4,170	11	0.056
INORGANICS				
169. Total Cyanide	<0.5	0.9	<0.47	
170. Fluoride	<5.0	31	3.2	
171. Sulfide	NA	830	<50	

NA = Not Analyzed.

* Only one sample of RCRA Blend waste was taken. The results are repeated in each sample set.

Table 4-4 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - ROTARY KILN INCINERATOR

SAMPLE SET #4 (Continued)

DESIGN AND OPERATING PARAMETERS

Parameter	Design	Operating Value
Kiln Temperature (^{o}F)	*	1775-1900
Kiln Solids Residence Time (min)	*	120
Waste Feed Rate (MMBTU/hr)	*	K019: 12.7 RCRA Blend, Waste Burner #1: 5.2-5.8 RCRA Blend, Waste Burner #2: 4.4-7.3
Kiln Rotational Speed (RPM)	*	0.19-0.21

*This information has been claimed as RCRA Confidential Business Information. The information is available in the confidential portion of the Administrative Record for this rulemaking.

Table 4-5

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - ROTARY KILN INCINERATOR

SAMPLE SET #5

Detected BDAT List Organic Constituents	Untreated Waste: K019 Concentration mg/kg (ppm)	Untreated Waste: RCRA Blend* Concentration mg/kg (ppm)	Treated Waste: Kiln Ash Concentration mg/kg (ppm)
VOLATILES			
4. Benzene	<2,000	2,000	<2
7. Carbon tetrachloride	4,000	<8	<2
9. Chlorobenzene	<2,000	<8	<2
14. Chloroform	6,000	<8	<2
22. 1,1-Dichloroethane	<2,000	<8	<2
23. 1,2-Dichloroethane	130,000	<8	<2
34. Methyl ethyl ketone	<10,000	940	<10
38. Methylene chloride	<10,000	910	<10
42. Tetrachloroethene	7,800	490	<2
43. Toluene	<2,000	2,300	<2
45. 1,1,1-Trichloroethane	45,000	130	<2
47. Trichloroethene	2,500	360	<2
215-217. Xylene (total)	<2,000	3,400	<2
222. Acetone	<10,000	1,200	<10
226. Ethyl benzene	<2,000	2,200	<2
229. Methyl isobutyl ketone	<10,000	1,100	<10
SEMIVOLATILES			
51. Acenaphthalene	<10	150	<2
57. Anthracene	<10	110	<2
65. Benzo(k)fluoranthene	<10	67	<2
68. Bis(2-chloroethyl) ether	340	<20	<2
70. Bis(2-ethylhexyl) phthalate	<10	40	<2
80. Chrysene	SNA	28	<2
87. o-Dichlorobenzene	<10	250	<2
88. p-Dichlorobenzene	90	32	<2
98. Di-n-butyl phthalate	<10	31	<2
108. Fluoranthene	<10	120	<2
109. Fluorene	19	53	<2
110. Hexachlorobenzene	87	<100	<10

SNA A standard is not available; the compound was searched using an NBS Library database of 42,000 compounds. The compound was not detected.

* Only one sample of RCRA Blend waste was taken. The results are repeated in each sample set.

Table 4-5 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - ROTARY KILN INCINERATOR

SAMPLE SET #5 (Continued)

Detected BDAT List Organic Constituents	Untreated Waste: K019 Concentration mg/kg (ppm)	Untreated Waste: RCRA Blend* Concentration mg/kg (ppm)	Treated Waste: Kiln Ash Concentration mg/kg (ppm)	Treated Waste: Kiln Ash TCLP mg/L (ppm)
SEMIVOLATILES (Continued)				
111. Hexachlorobutadiene	<50	210	<10	
113. Hexachloroethane	113	<100	<10	
121. Naphthalene	371	<20	<2	
126. Nitrobenzene	<25	3,400	<5	
136. Pentachlorobenzene	63	<100	<10	
141. Phenanthrene	19	240	<2	
142. Phenol	<10	78	<2	
145. Pyrene	<10	200	<2	
148. 1,2,4,5-Tetrachlorobenzene	73	<50	<5	
150. 1,2,4-Trichlorobenzene	72	<50	<5	
Detected BDAT List Metal and Inorganic Constituents				
METALS				
154. Antimony	<6.0	24	9.1	<0.060
155. Arsenic	<0.2	94	3.9	<0.002
156. Barium	<0.9	1.3	21	0.054
158. Cadmium	0.36	<0.3	1.2	0.006
159. Chromium	3.2	40	125	0.210
160. Copper	2.1	165	2,780	2.140
161. Lead	2.5	27	86	0.290
163. Nickel	4.8	8.8	166	1.270
165. Silver	<0.9	<0.9	3.3	<0.009
167. Vanadium	<2.0	2.2	5.7	<0.020
168. Zinc	4.7	4,170	22	0.086
INORGANICS				
169. Total Cyanide	<0.5	0.9	<0.47	
170. Fluoride	<5.0	31	23	
171. Sulfide	NA	830	64	

NA = Not Analyzed.

*Only one sample of RCRA Blend waste was taken. The results are repeated in each sample set.

Table 4-5 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - ROTARY KILN INCINERATOR

SAMPLE SET #5 (Continued)

DESIGN AND OPERATING PARAMETERS

Parameter	Design	Operating Value
Kiln Temperature (^{o}F)	*	1775-1800
Kiln Solids Residence Time (min)	*	120
Waste Feed Rate (MMBTU/hr)	*	K019: 11.7 RCRA Blend, Waste Burner #1: 5.5-6.0 RCRA Blend, Waste Burner #2: 5.2-9.7
Kiln Rotational Speed (RPM)	*	0.19-0.21

*This information has been claimed as RCRA Confidential Business Information. The information is available in the confidential portion of the Administrative Record for this rulemaking.

Table 4-6

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - ROTARY KILN INCINERATOR

SAMPLE SET #6

Detected BDAT List Organic Constituents	Untreated Waste: K019 Concentration mg/kg (ppm)	Untreated Waste: RCRA Blend* Concentration mg/kg (ppm)	Treated Waste: Kiln Ash Concentration mg/kg (ppm)
VOLATILES			
4. Benzene	<2,000	2,000	<2
7. Carbon tetrachloride	4,100	<8	<2
9. Chlorobenzene	<2,000	<8	<2
14. Chloroform	5,600	<8	<2
22. 1,1-Dichloroethane	<2,000	<8	<2
23. 1,2-Dichloroethane	98,000	<8	<2
34. Methyl ethyl ketone	<10,000	940	<10
38. Methylene chloride	<10,000	910	<10
42. Tetrachloroethene	6,900	490	<2
43. Toluene	<2,000	2,300	<2
45. 1,1,1-Trichloroethane	44,000	130	<2
47. Trichloroethene	2,500	360	<2
215-217. Xylene (total)	<2,000	3,400	<2
222. Acetone	<10,000	1,200	<10
226. Ethyl benzene	<2,000	2,200	<2
229. Methyl isobutyl ketone	<10,000	1,100	<10
SEMIVOLATILES			
51. Acenapthalene	<10	150	<2
57. Anthracene	<10	110	<2
65. Benzo(k)fluoranthene	<10	67	<2
68. Bis(2-chloroethyl) ether	330	<20	<2
70. Bis(2-ethylhexyl) phthalate	<10	40	<2
80. Chrysene	SNA	28	<2
87. o-Dichlorobenzene	<10	250	<2
88. p-Dichlorobenzene	90	32	<2
98. Di-n-butyl phthalate	<10	31	<2
108. Fluoranthene	<10	120	<2
109. Fluorene	22	53	<2
110. Hexachlorobenzene	66	<100	<10

SNA A standard is not available; the compound was searched using an NBS Library database of 42,000 compounds. The compound was not detected.

* Only one sample of RCRA Blend waste was taken. The results are repeated in each sample set.

Table 4-6 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - ROTARY KILN INCINERATOR

SAMPLE SET #6 (Continued)

Detected BDAT List Organic Constituents	Untreated Waste: K019 Concentration mg/kg (ppm)	Untreated Waste: RCRA Blend* Concentration mg/kg (ppm)	Treated Waste: Kiln Ash Concentration mg/kg (ppm)	Treated Waste: Kiln Ash TCLP mg/L (ppm)
SEMIVOLATILES (Continued)				
111. Hexachlorobutadiene	<50	210	<10	
113. Hexachloroethane	88	<100	<10	
121. Naphthalene	390	<20	<2	
126. Nitrobenzene	<25	3,400	<5	
136. Pentachlorobenzene	65	<100	<10	
141. Phenanthrene	17	240	<2	
142. Phenol	<10	78	<2	
145. Pyrene	<10	200	<2	
148. 1,2,4,5-Tetrachlorobenzene	86	<50	<5	
150. 1,2,4-Trichloroenzene	79	<50	<5	
Detected BDAT List Metal and Inorganic Constituents				
METALS				
154. Antimony	<6.0	24	9.6	< 0.06
155. Arsenic	<0.2	94	2.3	<0.002
156. Barium	<0.9	1.3	11	0.027
158. Cadmium	0.62	<0.3	2.2	0.006
159. Chromium	5.3	40	141	0.092
160. Copper	3.6	165	2,520	2.400
161. Lead	3.5	27	34	0.270
163. Nickel	6.0	8.8	288	0.690
165. Silver	<0.9	<0.9	3.1	<0.009
167. Vanadium	<2.0	2.2	8.7	<0.020
168. Zinc	8.4	4,170	13	0.061
INORGANICS				
169. Total Cyanide	<0.5	0.9	<0.47	
170. Fluoride	<5.0	31	4.7	
171. Sulfide	NA	830	92	

NA = Not Analyzed.

*Only one sample of RCRA Blend waste was taken. The results are repeated in each sample set.

Table 4-6 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - ROTARY KILN INCINERATOR

SAMPLE SET #6 (Continued)

DESIGN AND OPERATING PARAMETERS

Parameter	Design	Operating Value
Kiln Temperature (^{o}F)	*	1775-1850
Kiln Solids Residence Time (min)	*	120
Waste Feed Rate (MMBTU/hr)	*	K019: 11.5 RCRA Blend, Waste Burner #1: 5.2-5.8 RCRA Blend, Waste Burner #2: 5.2-9.7
Kiln Rotational Speed (RPM)	*	0.19-0.21

*This information has been claimed as RCRA Confidential Business Information. The information is available in the confidential portion of the Administrative Record for this rulemaking.

Table 4-7

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #1

Detected BDAT List Organic Constituents	Untreated Waste Concentration				Treated Waste
	K019 mg/kg (ppm)	RCRA Blend* mg/kg (ppm)	PCB Blend* mg/kg (ppm)	Mercaptan-Contaminated Waste* mg/L (ppm)	Scrubber Water mg/L (ppm)
VOLATILES					
4. Benzene	<2,000	2,000	<2,000	17.0	<0.002
7. Carbon tetrachloride	4,000	<8	<2,000	1.90	<0.002
9. Chlorobenzene	3,000	<8	<2,000	<0.4	<0.002
14. Chloroform	4,600	<8	<2,000	<0.4	<0.002
21. Dichlorodifluoromethane	<200	<8	<2,000	<0.4	<0.002
22. 1,1-Dichloroethane	2,200	<8	<2,000	<0.4	<0.002
23. 1,2-Dichloroethane	93,000	<8	<2,000	<0.4	<0.002
34. Methyl ethyl ketone	<1,000	940	<10,000	3.5	<0.01
38. Methylene chloride	<1,000	910	<10,000	<2.0	<0.01
42. Tetrachloroethene	7,300	490	<2,000	<0.4	<0.002
43. Toluene	<200	2,300	41,000	3.7	<0.002
45. 1,1,1-Trichloroethane	81,000	130	<2,000	2.3	<0.002
47. Trichloroethene	3,210	360	3,600	<0.4	<0.002
215-217. Xylene (total)	<200	3,400	36,000	4.4	<0.002
222. Acetone	<1,000	1,200	<10,000	<2.0	<0.01
226. Ethyl benzene	<200	2,200	16,000	4.1	<0.002
229. Methyl isobutyl ketone	<1,000	1,100	<10,000	<2.0	<0.01
SEMIVOLATILES					
51. Acenaphthalene	<10	150	120	<0.002	<0.002
52. Acenaphthene	<10	<20	480	<0.002	<0.002
56. Aniline	<25	<50	<250	1.22	<0.005
57. Anthracene	<10	110	400	<0.002	<0.002
65. Benzo(k)fluoranthene	<10	67	<100	<0.002	<0.002
68. Bis(2-chloroethyl)ether	280	<20	<100	<0.002	<0.002
70. Bis(2-ethylhexyl)phthalate	<10	40	<100	0.079	<0.002

* Only one sample of this waste type was taken. The results are repeated in each sample set.

Table 4-7 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #1 (Continued)

Detected BDAT List Organic Constituents	Untreated Waste Concentration				Treated Waste
	K019 mg/kg (ppm)	RCRA Blend* mg/kg (ppm)	PCB Blend* mg/kg (ppm)	Mercaptan-Contaminated Waste* mg/L (ppm)	Scrubber Water mg/L (ppm)
SEMIVOLATILES (Continued)					
80. Chrysene	SNA	28	<100	<0.002	<0.002
81. ortho-Cresol	<10	<20	<100	0.020	<0.002
87. o-Dichlorobenzene	<10	250	1,060	2.55	<0.002
88. p-Dichlorobenzene	81	32	460	0.260	<0.002
90. 2,4-Dichlorophenol	<25	<50	<250	0.420	<0.005
91. 2,6-Dichlorophenol	<25	<50	500	0.430	<0.005
98. Di-n-butyl phthalate	<10	31	120	0.012	<0.002
104. Di-n-octyl phthalate	<10	<20	430	<0.002	<0.002
108. Fluoranthene	<10	120	300	<0.002	<0.002
109. Fluorene	20	53	340	<0.002	<0.002
110. Hexachlorobenzene	69	<100	<500	0.022	<0.010
111. Hexachlorobutadiene	<50	210	<500	0.079	<0.010
113. Hexachloroethane	120	<100	<500	0.018	<0.010
121. Naphthalene	470	<20	400	0.133	<0.002
122. 1,4-Naphthoquinone	<10	<20	<100	0.078	<0.002
126. Nitrobenzene	<25	3,400	8,200	0.027	<0.005
136. Pentachlorobenzene	61	<100	1,000	0.020	<0.010
141. Phenanthrene	21	240	950	<0.002	<0.002
142. Phenol	<10	78	1,000	4.56	<0.002
145. Pyrene	<10	200	260	<0.002	<0.002
148. 1,2,4,5-Tetrachlorobenzene	76	<50	1,400	0.008	<0.005
150. 1,2,4-Trichlorobenzene	100	<50	19,000	1.24	<0.005
152. 2,4,6-Trichlorophenol	<50	<100	<500	0.037	<0.010

SNA A standard is not available; the compound was searched using an NBS Library data-base of 42,000 compounds. The compound was not detected.

* Only one sample of this waste type was taken. The results are repeated in each sample set.

Table 4-7 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #1 (Continued)

Detected BDAT List Metal, Inorganic and PCB Constituents	Untreated Waste Concentration				Treated Waste
	K019 mg/kg (ppm)	RCRA Blend* mg/kg (ppm)	PCB Blend* mg/kg (ppm)	Mercaptan-Contaminated Waste* mg/L (ppm)	Scrubber Water mg/L (ppm)
METALS					
154. Antimony	<6.0	24	<41	<0.060	0.41
155. Arsenic	1.2	94	7.4	<0.020	0.046
156. Barium	0.97	1.3	<19	1.670	0.48
157. Beryllium	<0.1	<0.1	NA	<0.001	<0.001
158. Cadmium	0.63	<0.3	<33	<0.003	0.23
159. Chromium	4.0	40	23.7	<0.009	0.11
160. Copper	2.1	165	107	0.027	1.81
161. Lead	3.4	27	<7.3	0.0064	0.82
162. Mercury	<0.05	<0.05	<5.5	<0.001	0.002
163. Nickel	3.0	8.8	6.2	0.037	0.081
165. Silver	<0.9	<0.9	<18	0.018	0.085
167. Vanadium	<2.0	2.2	<2.6	<0.020	0.16
168. Zinc	5.8	4,170	6810	0.071	11.4
INORGANICS					
169. Total Cyanide	<0.5	0.9	<0.5	<0.010	<0.01
170. Fluoride	<5.0	31	15	0.950	20.0
171. Sulfide	790	830	16,000	17.0	<1.0
PCBs					
206. Aroclor 1260	NA	NA	33,500	NA	NA

NA Not Analyzed.

* Only one sample of this waste type was taken. The results are repeated in each sample set.

Table 4-7 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #1 (Continued)

DESIGN AND OPERATING PARAMETERS	DESIGN	OPERATING VALUE
Afterburner Temperature (°F)	*	2380
Residence Time (sec)	*	2
Waste Feed Rate (MMBTU/hr)	*	PCB Blend Feed Rate: 36.1 Mercaptan-Contaminated Waste Feed Rate: 0.18
Excess Oxygen Concentration (%)		6.8
Carbon Monoxide Concentration (ppm volume)		NR

NR Not Recorded.

*This information has been claimed as RCRA Confidential Business Information. The information is available in the confidential portion of the Administrative Record for this rulemaking.

Table 4-8

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #2

Detected BDAT List Organic Constituents	Untreated Waste Concentration				Treated Waste
	K019 mg/kg (ppm)	RCRA Blend* mg/kg (ppm)	PCB Blend* mg/kg (ppm)	Mercaptan-Contaminated Waste* mg/L (ppm)	Sqrubber Water mg/L (ppm)
VOLATILES					
4. Benzene	<2,000	2,000	<2,000	17.0	<0.002
7. Carbon tetrachloride	3,8[illegible]	<8	<2,000	1.90	<0.002
9. Chlorobenzene	<2,000	<8	<2,000	<0.4	<0.002
14. Chloroform	5,800	<8	<2,000	<0.4	<0.002
21. Dichlorodifluoromethane	<2,000	<8	<2,000	<0.4	<0.002
22. 1,1-Dichloroethane	<2,000	<8	<2,000	<0.4	<0.002
23. 1,2-Dichloroethane	96,000	<8	<2,000	<0.4	<0.002
34. Methyl ethyl ketone	<10,000	940	<10,000	3.5	<0.010
38. Methylene chloride	<10,000	910	<10,000	<2.0	<0.010
42. Tetrachloroethene	6,700	490	<2,000	<0.4	<0.002
43. Toluene	<2,000	2,300	41,000	3.7	0.0032
45. 1,1,1-Trichloroethane	33,000	130	<2,000	2.3	<0.002
47. Trichloroethene	2,400	360	3,600	<0.4	<0.002
215-217. Xylene (total)	<2,000	3,400	36,000	4.4	<0.002
222. Acetone	<10,000	1,200	<10,000	<2.0	<0.01
226. Ethyl benzene	<2,000	2,200	16,000	4.1	<0.002
229. Methyl isobutyl ketone	<10,000	1,100	<10,000	<2.0	<0.01
SEMIVOLATILES					
51. Acenaphthalene	<10	150	120	<0.002	<0.002
52. Acenaphthene	<10	<20	480	<0.002	<0.002
56. Anilline	<25	<50	<250	1.22	<0.005
57. Anthracene	<10	110	400	<0.002	<0.002
65. Benzo(k)fluoranthene	<10	67	<100	<0.002	<0.002
68. Bis(2-chloroethyl)ether	280	<20	<100	<0.002	<0.002
70. Bis(2-ethylhexyl)phthalate	<10	40	<100	0.079	<0.002

* Only one sample of this waste type was taken. The results are repeated in each sample set.

Table 4-8 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #2 (Continued)

Detected BDAT List Organic Constituents	Untreated Waste Concentration				Treated Waste
	K019 mg/kg (ppm)	RCRA Blend* mg/kg (ppm)	PCB Blend* mg/kg (ppm)	Mercaptan-Contaminated Waste* mg/L (ppm)	Scrubber Water mg/L (ppm)
SEMIVOLATILES (Continued)					
80. Chrysene	SNA	28	<100	<0.002	<0.002
81. ortho-Cresol	<10	<20	<100	0.020	<0.002
87. o-Dichlorobenzene	<10	250	1,060	2.55	<0.002
88. p-Dichlorobenzene	74	32	460	0.260	<0.002
90. 2,4-Dichlorophenol	<25	<50	<250	0.420	<0.005
91. 2,6-Dichlorophenol	<25	<50	500	0.430	<0.005
98. Di-n-butyl phthalate	<10	31	120	0.012	0.0063
104. Di-n-octyl phthalate	<10	<20	430	<0.002	<0.002
108. Fluoranthene	<10	120	300	<0.002	<0.002
109. Fluorene	16	53	340	<0.002	<0.002
110. Hexachlorobenzene	60	<100	<500	0.022	<0.010
111. Hexachlorobutadiene	<50	210	<500	0.079	<0.010
113. Hexachloroethane	85	<100	<500	0.018	<0.010
121. Naphthalene	314	<20	400	0.133	<0.002
122. 1,4-Naphthoquinone	<10	<20	<100	0.078	<0.002
126. Nitrobenzene	<25	3,400	8,200	0.027	<0.005
136. Pentachlorobenzene	51	<100	1,000	0.020	<0.010
141. Phenanthrene	15	240	950	<0.002	<0.002
142. Phenol	<10	78	1,000	4.56	<0.002
145. Pyrene	<10	200	260	<0.002	<0.002
148. 1,2,4,5-Tetrachlorobenzene	62	<50	1,400	0.008	<0.005
150. 1,2,4-Trichlorobenzene	65	<50	19,000	1.24	<0.005
152. 2,4,6-Trichlorophenol	<50	<100	<500	0.037	<0.010

SNA A standard is not available; the compound was searched using an NBS Library data-base of 42,000 compounds. The compound was not detected.

* Only one sample of this waste type was taken. The results are repeated in each sample set.

Table 4-8 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #2 (Continued)

Detected BDAT List Metal, Inorganic and PCB Constituents	Untreated Waste Concentration				Treated Waste
	K019 mg/kg (ppm)	RCRA Blend* mg/kg (ppm)	PCB Blend* mg/kg (ppm)	Mercaptan-Contaminated Waste* mg/L (ppm)	Scrubber Water mg/L (ppm)
METALS					
154. Antimony	<6.0	24	<41	<0.060	0.39
155. Arsenic	<0.2	94	7.4	<0.020	0.038
156. Barium	<0.9	1.3	<19	1.670	0.50
157. Beryllium	<0.1	<0.1	NA	<0.001	<0.001
158. Cadmium	0.46	<0.3	<33	<0.003	0.19
159. Chromium	3.4	40	23.7	<0.009	0.14
160. Copper	1.7	165	107	0.027	1.38
161. Lead	2.3	27	<7.3	0 0064	0.78
162. Mercury	<0.05	<0.05	<5.5	<0.001	0.0026
163. Nickel	3.6	8.8	6.2	0.037	0.068
165. Silver	<0.9	<0.9	<18	0.018	0.095
167. Vanadium	<2.0	2.2	<2.6	<0.020	0.18
168. Zinc	6.9	4,170	6810	0.071	11.0
INORGANICS					
169. Total Cyanide	<0.5	0.9	<0.5	<0.010	<0.01
170. Fluoride	<5.0	31	15	0.950	15.0
171. Sulfide	NA	830	16,000	17.0	<1.0
PCBs					
206. Aroclor 1260	NA	NA	33,500	NA	NA

NA Not Analyzed.

* Only one sample of this waste type was taken. The results are repeated in each sample set.

Table 4-8 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #2 (Continued)

DESIGN AND OPERATING PARAMETERS	DESIGN	OPERATING VALUE
Afterburner Temperature (^{o}F)	*	2400
Residence Time (sec)	*	2
Waste Feed Rate (MMBTU/hr)	*	PCB Blend Feed Rate: 36.5 Mercaptan-Contaminated Waste Feed Rate: 0.18
Excess Oxygen Concentration (%)		7.0
Carbon Monoxide Concentration (ppm volume)		NR

NR Not Recorded.

*This information has been claimed as RCRA Confidential Business Information. The information is available in the confidential portion of the Administrative Record for this rulemaking.

Table 4-9

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #3

Detected BDAT List Organic Constituents	Untreated Waste Concentration				Treated Waste
	K019 mg/kg (ppm)	RCRA Blend* mg/kg (ppm)	PCB Blend* mg/kg (ppm)	Mercaptan-Contaminated Waste* mg/L (ppm)	Scrubber Water mg/L (ppm)
VOLATILES					
4. Benzene	<2,000	2,000	<2,000	17.0	<0.002
7. Carbon tetrachloride	3,500	<8	<2,000	1.90	<0.002
9. Chlorobenzene	<2,000	<8	<2,000	<0.4	<0.002
14. Chloroform	5.000	<8	<2,000	<0.4	<0.002
21. Dichlorodifluoromethane	<2,000	<8	<2,000	<0.4	0.0043
22. 1,1-Dichloroethane	<2,000	<8	<2,000	<0.4	<0.002
23. 1,2-Dichloroethane	87,000	<8	<2,000	<0.4	<0.002
34. Methyl ethyl ketone	<10,000	940	<10,000	3.5	<0.01
38. Methylene chloride	<10,000	910	<10,000	<2.0	<0.01
42. Tetrachloroethene	6,000	490	<2,000	<0.4	<0.002
43. Toluene	<2,000	2,300	41,000	3.7	0.0026
45. 1,1,1-Trichloroethane	34,000	130	<2,000	2.3	<0.002
47. Trichloroethene	2,200	360	3,600	<0.4	<0.002
215-217. Xylene (total)	<2,000	3,400	36,000	4.4	<0.002
222. Acetone	<10,000	1,200	<10,000	<2.0	<0.01
226. Ethyl benzene	<2,000	2,200	16,000	4.1	<0.002
229. Methyl isobutyl ketone	<10,000	1,100	<10,000	<2.0	<0.01
SEMIVOLATILES					
51. Acenaphthalene	<10	150	120	<0.002	<0.002
52. Acenaphthene	<10	<20	480	<0.002	<0.002
56. Aniline	<25	<50	<250	1.22	<0.005
57. Anthracene	<10	110	400	<0.002	<0.002
65. Benzo(k)fluoranthene	<10	67	<100	<0.002	<0.002
68. Bis(2-chloroethyl)ether	290	<20	<100	<0.002	<0.002
70. Bis(2-ethylhexyl)phthalate	<10	40	<100	0.079	<0.002

* Only one sample of this waste type was taken. The results are repeated in each sample set.

Table 4-9 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #3 (Continued)

Detected BDAT List Organic Constituents	Untreated Waste Concentration				Treated Waste
	K019 mg/kg (ppm)	RCRA Blend* mg/kg (ppm)	PCB Blend* mg/kg (ppm)	Mercaptan-Contaminated Waste* mg/L (ppm)	Scrubber Water mg/L (ppm)
SEMIVOLATILES (Continued)					
80. Chrysene	SNA	28	<100	<0.002	<0.002
81. ortho-Cresol	<10	<20	<100	0.020	<0.002
87. o-Dichlorobenzene	<10	250	1,060	2.55	<0.002
88. p-Dichlorobenzene	80	32	460	0.260	<0.002
90. 2,4-Dichlorophenol	<25	<50	<250	0.420	<0.005
91. 2,6-Dichlorophenol	<25	<50	500	0.430	<0.005
98. Di-n-butyl phthalate	<10	31	120	0.012	0.0046
104. Di-n-octyl phthalate	<10	<20	430	<0.002	<0.002
108. Fluoranthene	<10	120	300	<0.002	<0.002
109. Fluorene	19	53	340	<0.002	<0.002
110. Hexachlorobenzene	73	<100	<500	0.022	<0.01
111. Hexachlorobutadiene	<50	210	<500	0.079	<0.01
113. Hexachloroethane	95	<100	<500	0.018	<0.01
121. Naphthalene	350	<20	400	0.133	<0.002
122. 1,4-Naphthoquinone	<10	<20	<100	0.078	<0.002
126. Nitrobenzene	<25	3,400	8,200	0.027	<0.005
136. Pentachlorobenzene	59	<100	1,000	0.020	<0.010
141. Phenanthrene	11	240	950	<0.002	<0.002
142. Phenol	<10	78	1,000	4.56	<0.002
145. Pyrene	<10	200	260	<0.002	<0.002
148. 1,2,4,5-Tetrachlorobenzene	67	<50	1,400	0.008	<0.005
150. 1,2,4-Trichlorobenzene	70	<50	19,000	1.240	<0.005
152. 2,4,6-Trichlorophenol	<50	<100	<500	0.037	<0.010

SNA A standard is not available; the compound was searched using an NBS Library data-base of 42,000 compounds. The compound was not detected.

* Only one sample of this waste type was taken. The results are repeated in each sample set.

Table 4-9 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #3 (Continued)

Detected BDAT List Metal, Inorganic and PCB Constituents	Untreated Waste Concentration				Treated Waste
	K019 mg/kg (ppm)	RCRA Blend* mg/kg (ppm)	PCB Blend* mg/kg (ppm)	Mercaptan-Contaminated Waste* mg/L (ppm)	Scrubber Water mg/L (ppm)
METALS					
154. Antimony	<6.0	24	<41	<0.060	0.41
155. Arsenic	<0.2	94	7.4	<0.02	0.030
156. Barium	<0.9	1.3	<19	1.670	0.530
157. Beryllium	<0.1	<0.1	NA	<0.001	<0.001
158. Cadmium	0.53	<0.3	<33	<0.003	0.150
159. Chromium	3.5	40	23.7	<0.009	0.13
160. Copper	1.7	165	107	0.027	1.18
161. Lead	3.4	27	<7.3	0.0064	0.64
162. Mercury	<0.05	<0.05	<5.5	<0.001	0.0015
163. Nickel	2.3	8.8	6.2	0.037	0.057
165. Silver	<0.9	<0.9	<18	0.018	0.0092
167. Vanadium	<2.0	2.2	<2.6	<0.020	0.150
168. Zinc	4.4	4,170	6810	0.071	9.50
INORGANICS					
169. Total Cyanide	<0.5	0.9	<0.5	<0.010	<0.01
170. Fluoride	<5.0	31	15	0.950	14.0
171. Sulfide	NA	830	16,000	17.0	<1.0
PCBs					
206. Arochlor 1260	NA	NA	33,500	NA	NA

NA Not Analyzed.

* Only one sample of this waste type was taken. The results are repeated in each sample set.

Table 4-9 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #3 (Continued)

DESIGN AND OPERATING PARAMETERS	DESIGN	OPERATING VALUE
Afterburner Temperature (°F)	*	2400
Residence Time (sec)	*	2
Waste Feed Rate (MMBTU/hr)	*	PCB Blend Feed Rate: 36.5 Mercaptan-Contaminated Waste Feed Rate: 0.18
Excess Oxygen Concentration (%)		7.2
Carbon Monoxide Concentration (ppm volume)		0

*This information has been claimed as RCRA Confidential Business Information. The information is available in the confidential portion of the Administrative Record for this rulemaking.

Table 4-10

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #4

Detected BDAT List Organic Constituents	Untreated Waste Concentration				Treated Waste
	K019 mg/kg (ppm)	RCRA Blend* mg/kg (ppm)	PCB Blend* mg/kg (ppm)	Mercaptan-Contaminated Waste* mg/L (ppm)	Scrubber Water mg/L (ppm)
VOLATILES					
4. Benzene	<2,000	2,000	<2,000	17.0	<0.002
7. Carbon tetrachloride	3,900	<8	<2,000	1.90	<0.002
9. Chlorobenzene	<2,000	<8	<2,000	<0.4	<0.002
14. Chloroform	5,300	<8	<2,000	<0.4	<0.002
21. Dichlorodifluoromethane	<2,000	<8	<2,000	<0.4	0.014
22. 1,1-Dichloroethane	<2,000	<8	<2,000	<0.4	<0.002
23. 1,2-Dichloroethane	122,000	<8	<2,000	<0.4	<0.002
34. Methyl ethyl ketone	<10,000	940	<10,000	3.5	<0.01
38. Methylene chloride	<10,000	910	<10,000	<2.0	<0.01
42. Tetrachloroethene	7,200	490	<2,000	<0.4	<0.002
43. Toluene	<2,000	2,300	41,000	3.7	0.0046
45. 1,1,1-Trichloroethane	44,000	130	<2,000	2.3	<0.002
47. Trichloroethene	2,300	360	3,600	<0.4	<0.002
215-217. Xylene (total)	<2,000	3,400	36,000	4.4	<0.002
222. Acetone	<10,000	1,200	<10,000	<2.0	<0.01
226. Ethyl benzene	<2,000	2,200	16,000	4.1	<0.002
229. Methyl isobutyl ketone	<10,000	1,100	<10,000	<2.0	<0.01
SEMIVOLATILES					
51. Acenaphthalene	<10	150	120	<0.002	<0.002
52. Acenaphthene	<10	<20	480	<0.002	<0.002
56. Aniline	<25	<50	<250	1.22	<0.005
57. Anthracene	<10	110	400	<0.002	<0.002
65. Benzo(k)fluoranthene	<10	67	<100	<0.002	<0.002
68. Bis(2-chloroethyl)ether	310	<20	<100	<0.002	<0.002
70. Bis(2-ethylhexyl)phthalate	<10	40	<100	0.079	<0.002

* Only one sample of this waste type was taken. The results are repeated in each sample set.

Table 4-10 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #4 (Continued)

Detected BDAT List Organic Constituents	Untreated Waste Concentration				Treated Waste
	K019 mg/kg (ppm)	RCRA Blend* mg/kg (ppm)	PCB Blend* mg/kg (ppm)	Mercaptan-Contaminated Waste* mg/L (ppm)	Scrubber Water mg/L (ppm)
SEMIVOLATILES (Continued)					
80. Chrysene	SNA	28	<100	<0.002	<0.002
81. ortho-Cresol	<10	<20	<100	0.020	<0.002
87. o-Dichlorobenzene	<10	250	1,060	2.55	<0.002
88. p-Dichlorobenzene	84	32	460	0.260	<0.002
90. 2,4-Dichlorophenol	<25	<50	<250	0.420	<0.005
91. 2,6-Dichlorophenol	<25	<50	500	0.430	<0.005
98. Di-n-butyl phthalate	<10	31	120	0.012	0.0042
104. Di-n-octyl phthalate	<10	<20	430	<0.002	<0.002
108. Fluoranthene	<10	120	300	<0.002	<0.002
109. Fluorene	21	53	340	<0.002	<0.002
110. Hexachlorobenzene	61	<100	<500	0.022	<0.010
111. Hexachlorobutadiene	<50	210	<500	0.079	<0.010
113. Hexachloroethane	94	<100	<500	0.018	<0.010
121. Naphthalene	360	<20	400	0.133	<0.002
122. 1,4-Naphthoquinone	<10	<20	<100	0.078	<0.002
126. Nitrobenzene	<25	3,400	8,200	0.027	<0.005
136. Pentachlorobenzene	64	<100	1,000	0.020	<0.010
141. Phenanthrene	19	240	950	<0.002	<0.002
142. Phenol	<10	78	1,000	4.56	<0.002
145. Pyrene	<10	200	260	<0.002	<0.002
148. 1,2,4,5-Tetrachlorobenzene	82	<50	1,400	0.008	<0.005
150. 1,2,4-Trichlorobenzene	74	<50	19,000	1.240	<0.005
152. 2,4,6-Trichlorophenol	<50	<100	<500	0.037	<0.010

SNA A standard is not available; the compound was searched using an NBS Library data-base of 42,000 compounds. The compound was not detected.

* Only one sample of this waste type was taken. The results are repeated in each sample set.

Table 4-10 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #4 (Continued)

Detected BDAT List Metal, Inorganic and PCB Constituents	Untreated Waste Concentration				Treated Waste
	K019 mg/kg (ppm)	RCRA Blend* mg/kg (ppm)	PCB Blend* mg/kg (ppm)	Mercaptan-Contaminated Waste* mg/L (ppm)	Scrubber Water mg/L (ppm)
METALS					
154. Antimony	<6.0	24	<41	<0.060	0.4
155. Arsenic	<0.2	94	7.4	<0.020	0.029
156. Barium	<0.9	1.3	<19	1.670	0.55
157. Beryllium	<0.1	<0.1	NA	<0.001	<0.001
158. Cadmium	<0.3	<0.3	<33	<0.003	0.13
159. Chromium	1.8	40	23.7	<0.009	0.14
160. Copper	<1.0	165	107	0.027	1.13
161. Lead	2.4	27	<7.3	0.0064	0.600
162. Mercury	<0.05	<0.05	<5.5	<0.001	0.0004
163. Nickel	2.2	8.8	6.2	0.037	0.065
165. Silver	<0.9	<0.9	<18	0.018	0.092
167. Vanadium	<2.0	2.2	<2.6	<0.020	0.150
168. Zinc	9.4	4,170	6810	0.071	9.98
INORGANICS					
169. Total Cyanide	<0.5	0.9	<0.5	<0.010	<0.01
170. Fluoride	5.0	31	15	0.950	13.0
171. Sulfide	NA	830	16,000	17.0	<1.0
PCBs					
206. Aroclor 1260	NA	NA	33,500	NA	NA

NA Not Analyzed.

* Only one sample of this waste type was taken. The results are repeated in each sample set.

Table 4-10 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #4 (Continued)

DESIGN AND OPERATING PARAMETERS	DESIGN	OPERATING VALUE
Afterburner Temperature (^{o}F)	*	2400
Residence Time (sec)	*	2
Waste Feed Rate (MMBTU/hr)	*	PCB Blend Feed Rate: 36.5 Mercaptan-Contaminated Waste Feed Rate: 0.18
Excess Oxygen Concentration (%)		6.4
Carbon Monoxide Concentration (ppm volume)		0

*This information has been claimed as RCRA Confidential Business Information. The information is available in the confidential portion of the Administrative Record for this rulemaking.

Table 4-11

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #5

Detected BDAT List Organic Constituents	Untreated Waste Concentration				Treated Waste
	K019 mg/kg (ppm)	RCRA Blend* mg/kg (ppm)	PCB Blend* mg/kg (ppm)	Mercaptan-Contaminated Waste* mg/L (ppm)	Scrubber Water mg/L (ppm)
VOLATILES					
4. Benzene	<2,000	2,000	<2,000	17.0	<0.002
7. Carbon tetrachloride	4,000	<8	<2,000	1.90	<0.002
9. Chlorobenzene	<2,000	<8	<2,000	<0.4	<0.002
14. Chloroform	6,000	<8	<2,000	<0.4	<0.002
21. Dichlorodifluoromethane	<2,000	<8	<2,000	<0.4	<0.002
22. 1,1-Dichloroethane	<2,000	<8	<2,000	<0.4	<0.002
23. 1,2-Dichloroethane	130,000	<8	<2,000	<0.4	<0.002
34. Methyl ethyl ketone	<10,000	940	<10,000	3.5	<0.01
38. Methylene chloride	<10,000	910	<10,000	<2.0	<0.01
42. Tetrachloroethene	7,800	490	<2,000	<0.4	<0.002
43. Toluene	<2,000	2,300	41,000	3.7	<0.002
45. 1,1,1-Trichloroethane	45,000	130	<2,000	2.3	<0.002
47. Trichloroethene	2,500	360	3,600	<0.4	<0.002
215-217. Xylene (total)	<2,000	3,400	36,000	4.4	<0.002
222. Acetone	<10,000	1,200	<10,000	<2.0	<0.01
226. Ethyl benzene	<2,000	2,200	16,000	4.1	<0.002
229. Methyl isobutyl ketone	<10,000	1,100	<10,000	<2.0	<0.01
SEMIVOLATILES					
51. Acenaphthalene	<10	150	120	<0.002	<0.002
52. Acenaphthene	<10	<20	480	<0.002	<0.002
56. Aniline	<25	<50	<250	1.22	<0.005
57. Anthracene	<10	110	400	<0.002	<0.002
65. Benzo(k)fluoranthene	<10	67	<100	<0.002	<0.002
68. Bis(2-chloroethyl)ether	340	<20	<100	<0.002	<0.002
70. Bis(2-ethylhexyl)phthalate	<10	40	<100	0.079	<0.002

* Only one sample of this waste type was taken. The results are repeated in each sample set.

Table 4-11 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #5 (Continued)

Detected BDAT List Organic Constituents	Untreated Waste Concentration				Treated Waste
	K019 mg/kg (ppm)	RCRA Blend* mg/kg (ppm)	PCB Blend* mg/kg (ppm)	Mercaptan-Contaminated Waste* mg/L (ppm)	Scrubber Water mg/L (ppm)
SEMIVOLATILES (Continued)					
80. Chrysene	SNA	28	<100	<0.002	<0.002
81. ortho-Cresol	<10	<20	<100	0.020	<0.002
87. o-Dichlorobenzene	<10	250	1,060	2.55	<0.002
88. p-Dichlorobenzene	90	32	460	0.260	<0.002
90. 2,4-Dichlorophenol	<25	<50	<250	0.420	<0.005
91. 2,6-Dichlorophenol	<25	<50	500	0.430	<0.005
98. Di-n-butyl phthalate	<10	31	120	0.012	0.0027
104. Di-n-octyl phthalate	<10	<20	430	<0.002	<0.002
108. Fluoranthene	<10	120	300	<0.002	<0.002
109. Fluorene	19	53	340	<0.002	<0.002
110. Hexachlorobenzene	87	<100	<500	0.022	<0.01
111. Hexachlorobutadiene	<50	210	<500	0.079	<0.01
113. Hexachloroethane	113	<100	<500	0.018	<0.01
121. Naphthalene	371	<20	400	0.133	<0.002
122. 1,4-Naphthoquinone	<10	<20	<100	0.078	<0.002
126. Nitrobenzene	<25	3,400	8,200	0.027	<0.005
136. Pentachlorobenzene	63	<100	1,000	0.020	<0.01
141. Phenanthrene	19	240	950	<0.002	<0.002
142. Phenol	<10	78	1,000	4.56	<0.002
145. Pyrene	<10	200	260	<0.002	<0.002
148. 1,2,4,5-Tetrachlorobenzene	73	<50	1,400	0.008	<0.005
150. 1,2,4-Trichlorobenzene	72	<50	19,000	1.240	<0.005
152. 2,4,6-Trichlorophenol	<50	<100	<500	0.037	<0.010

SNA A standard is not available; the compound was searched using an NBS Library data-base of 42,000 compounds. The compound was not detected.

* Only one sample of this waste type was taken. The results are repeated in each sample set.

Table 4-11 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #5 (Continued)

Detected BDAT List Metal, Inorganic and PCB Constituents	Untreated Waste Concentration				Treated Waste
	K019 mg/kg (ppm)	RCRA Blend* mg/kg (ppm)	PCB Blend* mg/kg (ppm)	Mercaptan-Contaminated Waste* mg/L (ppm)	Scrubber Water mg/L (ppm)
METALS					
154. Antimony	<6.0	24	<41	<0.060	0.35
155. Arsenic	<0.2	94	7.4	<0.020	0.027
156. Barium	<0.9	1.3	<19	1.670	0.600
157. Beryllium	<0.1	<0.1	NA	<0.001	0.002
158. Cadmium	0.36	<0.3	<33	<0.003	0.12
159. Chromium	3.2	40	23.7	<0.009	0.14
160. Copper	2.1	165	107	0.027	1.03
161. Lead	2.5	27	<7.3	0.0064	0.48
162. Mercury	<0.05	<0.05	<5.5	<0.001	0.001
163. Nickel	4.8	8.8	6.2	0.037	0.067
165. Silver	<0.9	<0.9	<18	0.018	0.090
167. Vanadium	<2.0	2.2	<2.6	<0.020	0.160
168. Zinc	4.7	4,170	6810	0.071	11.1
INORGANICS					
169. Total Cyanide	<0.5	0.9	<0.5	<0.010	<0.01
170. Fluoride	<5.0	31	15	0.950	12.0
171. Sulfide	NA	830	16,000	17.0	<1.0
PCBs					
206. Aroclor 1260	NA	NA	33,500	NA	NA

NA Not Analyzed.

* Only one sample of this waste type was taken. The results are repeated in each sample set.

Table 4-11 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #5 (Continued)

DESIGN AND OPERATING PARAMETERS	DESIGN	OPERATING VALUE
Afterburner Temperature (^{o}F)	*	2400
Residence Time (sec)	*	2
Waste Feed Rate (MMBTU/hr)	*	PCB Blend Feed Rate: 37.5 Mercaptan-Contaminated Waste Feed Rate: 0.18
Excess Oxygen Concentration (%)		6.8
Carbon Monoxide Concentration (ppm volume)		NR

NR Not Recorded.

*This information has been claimed as RCRA Confidential Business Information. The information is available in the confidential portion of the Administrative Record for this rulemaking.

Table 4-12

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #6

Detected BDAT List Organic Constituents	Untreated Waste Concentration				Treated Waste
	K019 mg/kg (ppm)	RCRA Blend* mg/kg (ppm)	PCB Blend* mg/kg (ppm)	Mercaptan-Contaminated Waste* mg/L (ppm)	Scrubber Water mg/L (ppm)
VOLATILES					
4. Benzene	<2,000	2,000	<2,000	17.0	<0.002
7. Carbon tetrachloride	4,100	<8	<2,000	1.90	<0.002
9. Chlorobenzene	<2,000	<8	<2,000	<0.4	<0.002
14. Chloroform	5,600	<8	<2,000	<0.4	<0.002
21. Dichlorodifluoromethane	<2,000	<8	<2,000	<0.4	<0.002
22. 1,1-Dichloroethane	<2,000	<8	<2,000	<0.4	<0.002
23. 1,2-Dichloroethane	98,000	<8	<2,000	<0.4	<0.002
34. Methyl ethyl ketone	<10,000	940	<10,000	3.5	<0.01
38. Methylene chloride	<10,000	910	<10,000	<2.0	<0.01
42. Tetrachloroethene	6,900	490	<2,000	<0.4	<0.002
43. Toluene	<2,000	2,300	41,000	3.7	<0.002
45. 1,1,1-Trichloroethane	44,000	130	<2,000	2.3	<0.002
47. Trichloroethene	2,500	360	3,600	<0.4	<0.002
215-217. Xylene (total)	<2,000	3,400	36,000	4.4	<0.002
222. Acetone	<10,000	1,200	<10,000	<2.0	<0.01
226. Ethyl benzene	<2,000	2,200	16,000	4.1	<0.002
229. Methyl isobutyl ketone	<10,000	1,100	<10,000	<2.0	<0.01
SEMIVOLATILES					
51. Acenaphthalene	<10	150	120	<0.002	<0.002
52. Acenaphthene	<10	<20	480	<0.002	<0.002
56. Aniline	<25	<50	<250	1.22	<0.005
57. Anthracene	<10	110	400	<0.002	<0.002
65. Benzo(k)fluoranthene	<10	67	<100	<0.002	<0.002
68. Bis(2-chloroethyl)ether	330	<20	<100	<0.002	<0.002
70. Bis(2-ethylhexyl)phthalate	<10	40	<100	0.079	<0.002

* Only one sample of this waste type was taken. The results are repeated in each sample set.

Table 4-12 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #6 (Continued)

Detected BDAT List Organic Constituents	Untreated Waste Concentration				Treated Waste
	K019 mg/kg (ppm)	RCRA Blend* mg/kg (ppm)	PCB Blend* mg/kg (ppm)	Mercaptan-Contaminated Waste* mg/L (ppm)	Scrubber Water mg/L (ppm)
SEMIVOLATILES (Continued)					
80. Chrysene	SNA	28	<100	<0.002	<0.002
81. ortho-Cresol	<10	<20	<100	0.020	<0.002
87. o-Dichlorobenzene	<10	250	1,060	2.55	<0.002
88. p-Dichlorobenzene	90	32	460	0.260	<0.002
90. 2,4-Dichlorophenol	<25	<50	<250	0.420	<0.005
91. 2,6-Dichlorophenol	<25	<50	500	0.430	<0.005
98. Di-n-butyl phthalate	<10	31	120	0.012	0.0025
104. Di-n-octyl phthalate	<10	<20	430	<0.002	<0.002
108. Fluoranthene	<10	120	300	<0.002	<0.002
109. Fluorene	22	53	340	<0.002	<0.002
110. Hexachlorobenzene	66	<100	<500	0.022	<0.01
111. Hexachlorobutadiene	<50	210	<500	0.079	<0.01
113. Hexachloroethane	88	<100	<500	0.018	<0.01
121. Naphthalene	390	<20	400	0.133	<0.002
122. 1,4-Naphthoquinone	<10	<20	<100	0.078	<0.002
126. Nitrobenzene	<25	3,400	8,200	0.027	<0.005
136. Pentachlorobenzene	65	<100	1,000	0.020	<0.01
141. Phenanthrene	17	240	950	<0.002	<0.002
142. Phenol	<10	78	1,000	4.56	<0.002
145. Pyrene	<10	200	260	<0.002	<0.002
148. 1,2,4,5-Tetrachlorobenzene	86	<50	1,400	0.008	<0.005
150. 1,2,4-Trichlorobenzene	79	<50	19,000	1.24	<0.005
152. 2,4,6-Trichlorophenol	<50	<100	<500	0.037	<0.01

SNA A standard is not available; the compound was searched using an NBS Library data-base of 42,000 compounds. The compound was not detected.

* Only one sample of this waste type was taken. The results are repeated in each sample set.

Table 4-12 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #6 (Continued)

Detected BDAT List Metal, Inorganic and PCB Constituents	Untreated Waste Concentration				Treated Waste
	K019 mg/kg (ppm)	RCRA Blend* mg/kg (ppm)	PCB Blend* mg/kg (ppm)	Mercaptan-Contaminated Waste* mg/L (ppm)	Scrubber Water mg/L (ppm)
METALS					
154. Antimony	<6.0	24	<41	<0.060	0.32
155. Arsenic	<0.2	94	7.4	<0.020	0.033
156. Barium	<0.9	1.3	<19	1.670	0.57
157. Beryllium	<0.1	<0.1	NA	<0.001	<0.001
158. Cadmium	0.62	<0.3	<33	<0.003	0.11
159. Chromium	5.3	40	23.7	<0.009	0.13
160. Copper	3.6	165	107	0.027	0.87
161. Lead	3.5	27	<7.3	0.0064	0.4
162. Mercury	<0.05	<0.05	<5.5	<0.001	0.001
163. Nickel	6.0	8.8	6.2	0.037	0.061
165. Silver	<0.9	<0.9	<18	0.018	0.092
167. Vanadium	<2.0	2.2	<2.6	<0.020	0.16
168. Zinc	8.4	4,170	6810	0.071	10.4
INORGANICS					
169. Total Cyanide	<0.5	0.9	<0.5	<0.010	<0.01
170. Fluoride	<5.0	31	15	0.950	12.0
171. Sulfide	NA	830	16,000	17.0	<1.0
PCBs					
206. Aroclor 1260	NA	NA	33,500	NA	NA

NA Not Analyzed.

* Only one sample of this waste type was taken. The results are repeated in each sample set.

Table 4-12 (Continued)

TREATMENT PERFORMANCE DATA COLLECTED BY EPA FOR K019
PLANT A - COMBUSTION GAS SCRUBBER TREATMENT SYSTEM

SAMPLE SET #6 (Continued)

DESIGN AND OPERATING PARAMETERS	DESIGN	OPERATING VALUE
Afterburner Temperature (°F)	*	2350
Residence Time (sec)	*	2
Waste Feed Rate (MMBTU/hr)	*	PCB Blend Feed Rate: 37.5 Mercaptan-Contaminated Waste Feed Rate: 0.18
Excess Oxygen Concentration (%)		7.0
Carbon Monoxide Concentration (ppm volume)		NR

NR Not Recorded.

*This information has been claimed as RCRA Confidential Business Information. The information is available in the confidential portion of the Administrative Record for this rulemaking.

5. IDENTIFICATION OF BEST DEMONSTRATED AVAILABLE TECHNOLOGY

This section contains the determination of the the BDAT for the nonwastewater and wastewater forms of the halogenated aliphatic U-wastes. The EPA-approved SW-846 (USEPA 1986d) analytical method for volatile halogenated aliphatic U-waste is 8240 and the method for the semivolatiles (haxachloroethane, pentachloroethane, and hexachloropropane) is 8270. The Agency believes that the halogenated aliphatic U-wastes listed in Tables 1-1 and 1-2 can be present in both nonwastewater and wastewater forms. (The Agency believes, however, that only relatively small quantities of the wastewater forms of these wastes are generated.) The nonwastewater streams may include the raw waste as generated, the ash residual after incineration, residuals from other types of demonstrated treatment technologies (identified in Section 3) or the residuals from treatment of incinerator scrubber wastewaters. The wastewater residuals may be the raw waste as generated or combustion gas scrubber water from incineration or residuals from other demonstrated technologies (identified in Section 3) used to treat the waste.

5.1 Nonwastewaters

EPA has data from the incineration of F and K waste that contained constituents of concern from the halogenated aliphatics treatability group. These data from treatment of waste code K019 (used to develop the proposed standards) show nondetectable levels for the constituents of concern in the treated residuals. Because the treated residuals are below the detection limits, the Agency does not expect that better treatment can be achieved for the constituents of concern.

Because data from the other demonstrated technologies (identified in Section 3) are not available, the Agency cannot compare performance to determine which technology is "best." However, since incineration treats

to nondetectable levels, the Agency would not expect the level of performance to be improved by the other demonstrated technologies when compared to incineration.

EPA reviewed all the performance data available to determine whether substantial treatment was provided. The parameters examined included (1) the design and operating conditions, (2) the analytical testing, and (3) the quality assurance/quality control analyses of the data. After review of the above-mentioned parameters, EPA concluded that the data on which the Agency is basing treatment standards are of sufficient quality and show substantial treatment for the constituents of concern (because the constituents of concern in the residuals were treated below the detection limits). Design and operating conditions indicate that the treatment systems were all well designed and well operated during the test burns. In addition, the proper analytical tests and quality assurance techniques were performed on the untreated wastes and treated residuals. (For additional information on determination of BDAT, see EPA's Methodology for Developing Best Demonstrated Available Technology (BDAT) Treatment Standards.)

In addition, incineration is a commercially available technology. Since the criteria for best, demonstrated, and available have been met, the Agency has determined that incineration is BDAT for the organic constituents of halogenated aliphatic U-wastes.

5.2 Wastewasters

the Agency has data for scrubber water residuals from the incineration of F and K wastes that contained constituents of concern from the halogenated aliphatics treatability group. These data from treatment of waste code K019 (used to develop the proposed standards)

show nondetectable levels for the constituents of concern in the treated residuals. As a result, the Agency does not expect that better treatment can be achieved for the constituents of concern.

Because data from the other demonstrated technologies (identified in Section 3) are not presently available, the Agency cannot compare performance to determine which technology is "best." The Agency, however, does not expect the level of performance to be improved by the other demonstrated technologies when compared to incineration scrubber waters since incineration treats to nondetectable levels. If EPA determines at a later date that other data are more appropriate, the Agency may include these data in the development of the final treatment standards. (See next page for discussion of additional data that may be used to promulgate the final wastewater standards.)

EPA has determined that these incineration data (scrubber water data), as discussed in Section 5.1, are of sufficient quality and show substantial treatment (residuals were below the detection limit). Because incineration is a commercially available technology and the criteria for best, demonstrated, and available have been met, the Agency has determined that incineration is BDAT for halogenated aliphatic U-waste wastewaters.

The Agency believes that incineration of these wastewaters is feasible because incineration typically provides significant destruction (even for wastewaters) and that some of these wastewaters may actually contain high concentrations (near 1 percent total organic carbon (TOC)) of carbon. Furthermore, commenters to the Second Third proposed rule, indicated that they indeed were incinerating many wastewaters and they did not want to be precluded from doing so where EPA had proposed only carbon adsorption as a method of treatment for wastewater forms of certain U and P organo-phosphorous pesticides.

6. CALCULATION OF PROPOSED BDAT TREATMENT STANDARDS

The Agency bases numerical treatment standards for regulated constituents on the performance of well-designed and well-operated BDAT treatment systems. These standards account for analytical limitations in available treatment performance data and for variabilities related to treatment, sampling, and analytical techniques and procedures. The purpose of this section is to calculate proposed treatment standards for the halogenated aliphatic U-wastes using the available treatment performance data from the BDAT treatment technologies. The Agency has approved analytical methods for all of these wastes; therefore, the Agency is proposing that concentration-based treatment standards be met before the wastes may be disposed of on land once the standards are finalized. Therefore, the Agency has developed proposed treatment standards for both of these forms. A discussion of how the treatment standards for these wastes were calculated is included in this section. For further information on calculation of BDAT treatment standard see EPA document: Methodology for developing the Best Demonstrated Available (BDAT) Treatment Standards.

Treatment standards for the halogenated aliphatic U-wastes were calculated as follows. The Agency reviewed its BDAT incineration data base and selected the K019 performance data to be used for calculating the proposed nonwastewater and wastewater treatment standards for the halogenated aliphatic U-wastes. The Agency chose to use the K019 performance data because the K019 untreated waste contained 8 of the 19 constituents in the halogenated aliphatics treatability groups, i.e., chloroform, 1,1-dichloroethane, 1,2-dichloroethane, hexachloroethane, tetrachloroethane, carbon tetrachloride, 1,1,1-trichloroethane, and trichloroethylene. Also, K019 was considered a relatively difficult waste matrix to treat based on the waste characteristics affecting performance, i.e., bond dissociation energy and boiling points, and the parameters affecting treatment. Further, the K019 untreated waste

contained significant concentrations of the constituents of concern in the halogenated aliphatics treatability group (ranging from 85 mg/kg for hexachloroethane to 130,000 mg/kg for 1,2-dichloroethane). Further, all constituents of concern were treated to nondetectable levels in the treated ash and scrubber water residuals.

Treatment standards for nonwastewaters and wastewaters were calculated by multiplying the highest detection limit for each waste constituent by the highest analytical recovery factor (i.e., lowest percent recovery) for that constituent or a similar constituent and then by a variability factor of 2.8 (used when the treated residuals are below the detection limit). Appendix A presents the treated waste detection limits for all of the incineration performance data considered by the Agency for this rulemaking including an F024 test burn, and a burn in June 1989. If the constituent to be regulated was not present in K019 untreated waste, then the Agency compared the detection limit of the constituent to be regulated and a similar constituent present in K019 untreated waste. The Agency then selected the higher detection limit of the two. K019 incinerator ash and scrubber water detection limits are included in Table 6-3 and 6-4. Included in Appendix B are the K019 matrix spike recoveries for the kiln ash residue and combustion gas scrubber discharge water.

Before the proposed treatment standards were calculated, the treatment performance data were corrected to account for analytical interferences associated with the chemical matrices of the samples. The treatment performance data were corrected by applying the lowest percent recovery calculated for that constituent. The correction factor was then calculated as the reciprocal of the lowest percent recovery. The detection limits were then multiplied by this correction factor. Wherever EPA transferred the performance data (for constituents not present in K019 untreated waste), the Agency used the lowest percent recovery value from the constituent from which the transfer was made.

If recovery values were not available for a constituent, the Agency selected the lowest average percent recovery for the acid extractables or base-neutral extractables, (depending on which group the constituent belonged).

Since the K019 treatment performance data show that all the constituents of concern in the halogenated aliphatic U-waste treatability group were treated below the detection limits, the Agency decided to use the detection limit data to calculate the proposed treatment standard.

The next step in calculating treatment standards is to determine the variability factor (VF) for each regulated constituent. The variability factor accounts for the variability inherent in treatment system performance, treatment residual collection, and analysis of the treated waste samples. K019 treated residuals were treated below the detection limit. Where concentrations in the treated waste were reported at less than or equal to the detection limit for all test runs for a specific constituent, variability was still expected since the actual concentration could range from 0 to the detection limit. In these cases, the Agency assumed a lognormal distribution of data points between the detection limit and a value one-tenth of the detection limit, and calculated a variability of 2.8. (For more information on calculation of variability factors, see EPA's Methodology for Developing BDAT Treatment Standards.)

Finally, proposed treatment standards were calculated by multiplying the corrected treatment performance values by the variability factor of 2.8 for each constituent.

Tables 6-1 and 6-2 (following this section) summarize the calculation of treatment standards for the wastes included in this document. Sections 6.1 and 6.2 describe transfer of treatment data and calculation of the proposed treatment standards in greater detail.

6.1

Nonwastewaters

6.1.1 Calculation of Proposed Treatment Standards for Nonwastewater Forms of U044, U076, U077, U131, U210, U211, U226, and U228

The proposed treatment standards for nonwastewater forms of U044, U076, U077, U131, U210, U211, U226, and U228 were calculated using six data sets from rotary kiln incineration of K019 waste. Table 6-3 presents the concentration values (detection limits) for organic constituents from the treated wastes resulting from incineration of K019 at plant A.

All of the above-mentioned wastes were present in the untreated K019 waste; therefore, the proposed treatment standards were calculated by multiplying the detection limit of the constituent times the analytical accuracy-correction factor times a variability factor of 2.8.

6.1.2 Calculation of Proposed Treatment Standards for Nonwastewater Forms of U074* (cis and trans isomers), U078, U079*, U080, U083, U084* (cis and trans isomers), U184, U208, U209, U227, and U243

Treatment performance data were not available for treatment of U074, U078, U079, U080, U083, U084, U184, U208, U209, U227, and U243. Where

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* U074, U079, and U084 wastes are listed as 1,4-dichlorobutene, 1,2-dichloroethylene, and 1,3-dichloropropene, respectively. Because of the position of the chlorine on these alkenes, all the chemicals have steroisomers identified as "cis-" and "trans-." For U074 and U084 waste, both the "cis-" and the "trans-" isomers can be quantified using SW-846 methods. Therefore, concentration-based treatment standards are being proposed for both isomers of the two compounds. While 40 CFR 261.33(f) lists U079 wastes as 1,2-dichloroethylene, the chemical abstracts identification number that is listed for this compound (156-60-5) is specified for trans-1,2-dichloroethylene. Since this trans-isomer is also specified in 40 CFR Part 261, Appendix VIII, the Agency is proposing concentration-based treatment standards only for trans-1,2-dichloroethylene (U079).

data are not available on the treatment technology of concern, the Agency may elect to transfer data on the treatment of a similar waste or wastes, using a demonstrated technology. To transfer data from another waste category, EPA must find that the wastes to be regulated are no more difficult to treat (based on the waste characteristics that affect performance of the demonstrated treatment technology) than the treated wastes from which performance data are being transferred.

The transfer of treatment data is supported by the determination that these wastes are part of a single waste treatability group. The determination of the waste treatability group is based on the similarity in composition of the untreated wastes, the fact that all of these wastes are generated by the organic chemicals industry, and the Agency's belief that the constituents in these wastes can be treated to similar concentrations using the same technology.

The particular constituent from which data are transferred is determined based on the characteristics of the waste that affect treatment performance by incineration with respect to the nonwastewater residual (i.e., incinerator ash). In the incinerator, energy in the form of heat is transferred to the waste to volatilize the organic waste constituents prior to combustion. To determine whether one constituent is equally, or more difficult to volatilize than another constituent, the Agency examines the boiling points of the constituents. In general, the Agency believes that a constituent with a higher boiling point (bp) is more difficult to treat than a constituent with a lower boiling point.

The Agency also considers the bond dissociation energy (BDE) of the constituents of concern in determining the incinerability and considers constituents with higher BDEs more difficult to treat than constituents with lower BDEs. In all cases the BDE of the constituent from which the

transfer has been performed is higher than the BDE of the constituent to which the transfer is to be applied.

Therefore, treatment performance data were transferred to untested nonwastewaters from constituents detected in tested untreated wastes that had equal or higher boiling points, and/or higher BDEs.

As mentioned earlier, the Agency does not have performance data for U074, U078, U079, U080, U083, U084, U184, U208, U209, U227, and U243. Therefore, EPA decided to transfer the performance data from similar constituents in K019 to these halogenated aliphatic U-wastes. The following is a detailed description of the transfer methodology associated with each of the halogenated U-wastes.

U074. cis- and trans-1,4-Dichloro-2-butene. The treatment standard for cis- and trans-1,4-dichloro-2-butene (bp 154; BDE 1,085 kcal/mol) is based on data transferred from treatment of bis(2-chloroethyl)ether (bp 178; BDE 1,290 kcal/mol) in K019 because bis(2-chloroethyl)ether has a higher bp and DBE than 1,4-dichloro-2-butene. Based on these waste characteristics affecting treatment performance for incineration, the Agency expects that cis- and trans-1,4-dichloro-2-butene can be treated to concentration levels as low as or lower than those of bis (2-chloroethyl)ether.

U078. 1,1-Dichloroethylene. The treatment standard for 1,1-dichloroethylene (bp 31.9°C; BDE 515 kcal/mol) is based on data transferred from the treatment of 1,1-dichloroethane in K019 (bp 57.15°C; BDE 740 kcal/mol) because 1,1-dichloroethane has a higher bp and BDE than 1,1-dichloroethylene. In addition, 1,1-dichloroethane test data from K019 were used to regulate 1,1-dichloroethylene when 1,1-dichloroethylene appeared in waste code K029. Based on these waste

characteristics that affect treatment performance for incineration, the Agency expects that 1,1-dichloroethylene can be treated to concentrations as low as or lower than those of 1,1-dichloroethane.

U079. trans-1,2-Dichloroethylene. The treatment standard for trans-1,2-dichloroethylene (bp 55°C; BDE 515 kcal/mol) is based on data transferred from 1,1-dichloroethane in K019 (bp 57.15°C; BDE 740 kcal/mol) because 1,1-dichloroethane has a higher boiling point and BDE than trans-1,2-dichloroethylene. In addition, 1,1-dichloroethane test data from K019 were used to regulate trans-1,2-dichloroethylene when 1,1-dichloroethylene (which is very similar to 1,2-dichloroethylene) appeared in waste code K029. Based on these waste characteristics that affect treatment performance incineration, the Agency expects that trans-1,2-dichloroethylene can be treated to concentrations as low as or lower than those of 1,1-dichloroethane.

U080. Methylene chloride. The treatment standard for methylene chloride (bp 41°C; BDE 370 kcal/mol) is based on data transferred from treatment of 1,1-dichloroethane (bp 57.15°C; BDE 740 kcal/mol) in K019. Based on these waste characteristics affecting treatment performance of incineration, the Agency expects that methylene chloride can be treated to concentration levels as low or lower than those of 1,1-dichloroethane.

U083. 1,2-Dichloropropane. The treatment standard for 1,2-dichloropropane (bp 95-96°C; BDE 940 kcal/mol) is based on data transferred from bis(2-chloroethyl)ether (bp 178°C; BDE 1290 kcal/mol) because bis(2-chloroethyl)ether has a higher bp and BDE than 1,2-dichloropropane. Based on these waste characteristics that affect treatment performance for incineration, the Agency expects that 1,2-dichloropropane can be treated to concentrations as low as or lower than those of bis(2-chloroethyl)ether.

U084. Cis- and trans-1,3-Dichloropropene. The treatment standard for cis- and trans-1,3-Dichloropropene (bp 120.4°C; BDE 800 kcal/mol) is based on data transferred from bis(2-chloroethyl)ether (bp 178°C; BDE 1290 kcal/mol) in K019 because bis(2-chloroethyl)ether has a higher bp and BDE than those of cis- and trans-1,3-dichloropropene. Based on these waste characteristics that affect treatment performance for incineration, the Agency expects that cis- and trans-1,3-dichloropropene can be treated to concentrations as low as or lower than those of bis(2-chloroethyl)ether.

U184. Pentachloroethane. The treatment standard for pentachloroethane (BDE 610 kcal/mol) is based on data transferred from 1,1,1-trichloroethane (BDE 625 kcal/mol) in K019 because 1,1,1-trichloroethane has a higher BDE than pentachloroethane. In addition, 1,1,1-trichloroethane test data from K019 were used to regulate pentachloroethane when pentachloroethane appeared in waste code K028. Based on this waste characteristic that affects treatment performance for incineration, the Agency expects that pentachloroethane can be treated to concentrations as low as or lower than those of 1,1,1-trichloroethane.

U208. 1,1,1,2-Tetrachloroethane. The treatment standard for 1,1,1,2-tetrachloroethane (BDE 625 kcal/mol) is based on a transfer of data from 1,1,1-trichloroethane (BDE 640 kcal/mol) in K019 because 1,1,1-trichloroethane has a higher BDE than 1,1,1,2-tetrachloroethane. In addition, 1,1,1-trichloroethane test data from K019 were used to regulate 1,1,1,2-tetrachloroethane when 1,1,1,2-tetrachloroethane appeared in waste code K028. Based on this waste characteristic that affect treatment performance for incineration, the Agency expects that 1,1,1,2-tetrachloroethane can be treated to concentrations as low as or lower than those of 1,1,1-trichloroethane.

U209. 1,1,2,2-Tetrachloroethane. The treatment standard for 1,1,2,2-tetrachloroethane (BDE 625 kcal/mol) is based on data transferred from 1,1,1-trichloroethane (BDE 640 kcal/mol) in K019 because 1,1,1-trichloroethane has a higher BDE than 1,1,2,2-tetrachloroethane. In addition, 1,1,1-trichloroethane test data from K019 was used to regulate 1,1,2,2-tetrachloroethane when 1,1,2,2-tetrachloroethane appeared in waste code K028. Based on this waste characteristic that affect treatment performance for incineration, the Agency expects that 1,1,2,2-tetrachloroethane can be treated to concentrations as low as or lower than those of 1,1,1-trichloroethane.

U227. 1,1,2-Trichloroethane. The treatment standard for 1,1,2-trichloroethane (BDE 640 kcal/mol) is based on data transferred from 1,1,1-trichloroethane in K019 because 1,1,1-trichloroethane has an identical BDE of 640 kcal/mol. Based on this waste characteristic that affects treatment performance for incineration, the Agency expects that 1,1,2-trichloroethane can be treated to concentrations as low as those of 1,1,1-trichloroethane.

U243. Hexachloropropene. The treatment standard for hexachloropropene (BDE 755 kcal/mol) is based on data transferred from 1,2,4-trichlorobenzene (BDE 1,324 kcal/mol) in K019. Based on this waste characteristic that affects treatment performance for incineration, the Agency expects that hexachloropropene can be treated to concentrations as low as or lower than those of 1,2,4-trichlorobenzene.

6.2 Wastewaters

The proposed BDAT treatment standards for the wastewater forms of the halogenated aliphatic U-wastes are based on the K019 incineration scrubber water residuals. The methodology for the transfer of performance data from K019 to the wastewater forms of halogenated

aliphatic U-wastes are identical to those presented in Section 6.1.2 for the nonwastewater forms; however, the standards for wastewaters are based on incinerator scrubber water residuals.

The Agency is proposing to use the incineration scrubber water residuals data to develop the proposed wastewater standards because incineration typically provides significant destruction (even for wastewaters) and that some of the wastewaters may actually contain high concentrations [near 1 percent total organic carbon (TOC)] of carbon. Furthermore, commenters to the Second Third proposed rule, indicated that they indeed were incinerating many wastewaters and they did not want to be precluded from doing so where EPA had proposed only carbon adsorption as a method of treatment for wastewater forms of certain U and P · organophosphorous pesticides.

Table 6-1 Calculation of Treatment Standards for Halogenated Aliphatic U-wastes (Nonwastewaters)

Waste code	Constituent	Waste detection limit transferred from	Highest detection limit (DL) (ppm)	Accuracy-correction factor (ACF)	Accuracy-correction factor transferred from	Variability factor (VF)	Treatment standard (ppm) (DL x ACF x VF)
U044	Chloroform	K019	2.0	1.10	Chloroform, K019	2.8	6.2
U074	trans-1,4-Dichloro-2-butene	K019	10.0	1.06	Bis(2-chloroethyl)ether, K019	2.8	30
U074	cis-1,4-Dichloro-2-butene	K019	10.0 [a]	1.06	Bis(2-chloroethyl)ether, K019	2.8	30
U076	1,1-Dichloroethane	K019	2.0	1.10	1,1-Dichloroethane, K019	2.8	6.2
U077	1,2-Dichloroethane	K019	2.0	1.10	1,2-Dichloroethane, K019	2.8	6.2
U078	1,1-Dichloroethylene	K019	2.0	1.10	1,1-Dichloroethane, K019	2.8	6.2
U079	trans-1,2-Dichloroethylene	K019	2.0	1.10	1,1-Dichloroethane, K019	2.8	6.2
U080	Methylene chloride	K019	10.0	1.10	1,1-Dichloroethane, K019	2.8	31
U083	1,2-Dichloropropane	K019	5.0	1.06	Bis(2-chloroethly)ether, K019	2.8	15
U084	cis-1,3-Dichloropropene	K019	5.0	1.06	Bis(2-chloroethyl)ether, K019	2.8	15
U084	trans-1,3-Dichloropropene	K019	5.0	1.06	Bis(2-chloroethyl)ether, K019	2.8	15
U131	Hexachloroethane	K019	10.0	1.06	Hexachloroethane, K019	2.8	30
U184	Pentachloroethane	K019	10.0	1.10	1,1,1-Trichloroethane, K019	2.8	31
U208	1,1,1,2-Tetrachloroethane	K019	2.0	1.10	1,1,1-Trichloroethane, K019	2.8	6.2
U209	1,1,2,2-Tetrachloroethane	K019	2.0	1.10	1,1,1-Trichloroethane, K019	2.8	6.2
U210	Tetrachloroethylene	K019	2.0	1.10	Tetrachloroethylene, K019	2.8	6.2
U211	Carbon tetrachloride	K019	2.0	1.10	1,1,1-Trichloroethane, K019	2.8	6.2
U226	1,1,1-Trichloroethane	K019	2.0	1.10	1,1,2-Trichloroethane, K019	2.8	6.2
U227	1,1,2-Trichloroethane	K019	2.0	1.10	1,1,2-Trichloroethane, K019	2.8	6.2
U228	Trichloroethylene	K019	2.0	1.0	Trichloroethylene, K019	2.8	5.6
U243	Hexachloropropene	K019	10.0	1.33	1,2,4-Trichlorobenzene, K019	2.8	37

[a] Detection limit transferred from trans 1,4-dichloro-2-butane

Table 6-2 Calculation of Treatment Standards for Halogenated Aliphatic U-wastes (Wastewaters)

Waste code	Constituent	Waste detection limit transferred from	Highest detection limit (DL) (ppm)	Accuracy-correction factor (ACF)	Accuracy-correction factor transferred from	Variability factor (VF)	Treatment standard (ppm) (DL x ACF x VF)
U044	Chloroform	K019	0.002	1.32	Chloroform, K019	2.8	0.007
U074	trans-1,4-Dichloro-2-butene	K019	0.010	1.20	Bis(2-chloroethyl)ether, K019	2.8	0.034
U074	cis-1,4-Dichloro-2-butene	K019	0.010 [a]	1.20	Bis(2-chloroethyl)ether, K019	2.8	0.034
U076	1,1-Dichloroethane	K019	0.002	1.32	1,1-Dichloroethane, K019	2.8	0.007
U077	1,2-Dichloroethylene	K019	0.002	1.32	1,2-Dichloroethane, K019	2.8	0.007
U078	1,1-Dichloroethylene	K019	0.002	1.32	1,1-Dichloroethane, K019	2.8	0.007
U079	trans-1,2-Dichloroethylene	K019	0.002	1.32	1,1-Dichloroethane, K019	2.8	0.007
U080	Methylene chloride	K019	0.010	1.32	1,1-Dichloroethane, K019	2.8	0.037
U083	1,2-Dichloropropane	K019	0.020	1.20	Bis-2-chloroethyl)ether, K019	2.8	0.067
U084	cis-1,3-Dichloropropene	K019	0.020	1.20	Bis(2-chloroethyl)ether, K019	2.8	0.067
U084	trans-1,3-Dichloropropene	K019	0.020	1.20	Bis(2-chloroethyl)ether, K019	2.8	0.067
U131	Hexachloroethane	K019	0.010	1.20	Hexachloroethane, K019	2.8	0.034
U184	Pentachloroethane	K019	0.010	1.32	1,1,1-Trichloroethane, K019	2.8	0.037
U208	1,1,1,2-Tetrachloroethane	K019	0.002	1.32	1,1,1-Trichloroethane, K019	2.8	0.007
U209	1,1,2,2-Tetrachloroethane	K019	0.002	1.32	1,1,1-Trichloroethane, K019	2.8	0.007
U210	Tetrachloroethylene	K019	0.002	1.32	Tetrachloroethylene, K019	2.8	0.007
U211	Carbon Tetrachloride	K019	0.002	1.32	Carbon tetrachloride, K019	2.8	0.007
U226	1,1,1-Trichloroethane	K019	0.002	1.32	1,1,2-Tetrachloride, K019	2.8	0.007
U227	1,1,2-Trichloroethane	K019	0.002	1.32	1,1,2-Trichloroethane, K019	2.8	0.007
U228	Trichloroethylene	K019	0.002	1.19	Trichloroethylene, K019	2.8	0.007
U243	Hexachloropropene	K019	0.010	1.67	1,2,4-Trichlorobenzene, K019	2.8	0.047

[a] Detection limit transferred from trans 1,4-dichloro-2-butane

Table 6-3 Ash BDAT List Constituent Detection Limits for K019

BDAT constituent		Detection limit	BDAT constituent		Detection limit
Volatile constituents:		(ppm)	Volatile constituents:		(ppm)
1	Acetonitrile	10	32	Iodomethane	2
2	Acrolein	100	33	Isobutyl alcohol	2
3	Acrylonitrile	10	34	Methyl ethyl ketone	10
4	Benzene	2	35	Methyl methacrylate	2
5	Bromodichloromethane	2	37	Methylacrylonitrile	10
6	Bromomethane	2	38	Methylene chloride	10
7	Carbon tetrachloride	2	40	1,1,1,2-Tetrachloroethane	2
8	Carbon disulfide	NA	41	1,1,2,2-Tetrachloroethane	2
9	Chlorobenzene	2	42	Tetrachloroethene	2
10	2-Chloro-1,3-butadiene	2	43	Toluene	2
11	Chlorodibromomethane	2	44	Tribromomethane	2
12	Chloroethane	2	45	1,1,1-Trichloroethane	2
13	2-Chloroethyl vinyl ether	NA	46	1,1,2-Trichloroethane	2
14	Chloroform	2	47	Trichloroethene	2
15	Chloromethane	2	48	Trichloromonofluoromethane	2
16	3-Chloropropane	2	49	1,2,3-Trichloropropane	5
17	1,2-Dibromo-3-chloropropane	2	50	Vinyl chloride	2
18	1,2-Dibromoethane	2	79	3-Chloropropionitrile[a]	NA
19	Dibromomethane	2	*	Acetone	10
20	Trans-1,4-dichloro-2-butane	10	*	Allyl alcohol	NA
21	Dichlorodifluoromethane	2	*	Ethyl benzene	2
22	1,1-Dichloroethane	2	*	Ethylene oxide	NA
23	1,2-Dichloroethane	2	*	2-Hexanone	10
24	1,1-Dichloroethylene	2	*	Malononitrile	NA
25	Trans-1,2-dichloroethane	2	*	4-Methyl-2-pentanone	10
26	1,2-Dichloropropane	5	*	2-Propyn-1-ol	NA
27	Trans-1,3-dichloropropane	5	*	Styrene	2
28	cis-1,3-Dichloropropane	5	*	Trichloromethanethiol	NA
29	1,4-Dioxane	NA	*	Vinly acetate	2
30	Ethyl cyanide	100	*	Xylene (total)	2
31	Ethyl methacrylate	2			

Table 6-3 (continued)

	BDAT constituent	Detection limit		BDAT constituent	Detection limit
	Semivolatile constituents:	(ppm)		Semivolatile constituents:	(ppm)
38	Methyl methanesulfonate[b]	10	97	Dimethyl phthalate	2
39	Pyridine[b]	20	98	Di-n-butyl phthalate	2
51	Acenaphthalene	2	99	1,4-Dinitrobenzene	10
52	Acenaphthane	2	100	4,5-Dinitro-o-cresol	50
53	Acetophenane	2	101	2,4-Dinitrophenol	50
54	2-Acetylaminofluorene	NA	102	2,4-Dinitrotoluene	50
55	4-Aminobiphenyl	2	103	2,5-Dinitrotoluene	10
56	Aniline	5	104	Di-n-octyl phthalate	2
57	Anthracene	2	105	Di-n-propylnitrosamine	5
58	Aramite	NA	106	Diphenylamine	2
59	Benz(a)anthracene	2	107	1,2-Diphenylhydrazine	2
60	Benzenethiol	NA	108	Fluoranthene	2
61	Benzidine	2	109	Fluorene	2
62	Benzo(a)pyrene	2	110	Hexachlorobenzene	10
63	Benzo(b)fluoranthene	NA	111	Hexachlorobutadiene	10
64	Benzo(g,h,i)perylene	5	112	Hexachlorocyclopentadiene	10
65	Benzo(k)fluoranthene	2	113	Hexachloroethane	10
66	p-Benzoquinone	NA	114	Hexachlorophene	NA
67	Bis(2-chloroethoxy)ethane	2	115	Hexachloropropane	10
68	Bis(2-chloroethyl)ether	2	116	Indeno(1,2,3-c,d)pyrene	5
69	Bis(2-chloroisopropyl)ether	2	117	Isosafrole	NA
70	Bis(2-ethylexyl)phthalate	2	118	Methapyrilene	NA
71	4-Bromophenyl phenyl ether	10	119	3-Methylcholanthrene	NA
72	Butyl benzyl phthalate	2	120	4,4'-Methylenabis(2-chloroaniline)	NA
73	2-sec-Butyl-4,6-dinitrophenol	NA	121	Naphthelene	2
74	p-Chloroaniline	5	122	1,4-Naphthoquinone	2
75	Chlorobenzilate	NA	123	1-Naphthylamine	2
76	p-Chloro-a-cresol	5	124	2-Naphthylamine	2
77	2-Chloronaphthalene	2	125	p-Nitroaniline	10
78	2-Chlorophenol	2	126	Nitrobenzene	5
80	Chrysene	2	127	4-Nitrophenol	10
81	ortho-Cresol	2	128	N-Nitrosodi-n-butylamine	5
82	para-Cresol	2	129	N-Nitrosodiethylamine	10
83	Dibenz(a,h)anthracene	2	130	N-Nitrosodimethylamine	20
84	Dibenzo(a,e)pyrene	NA	131	N-Nitrosomethylethylamine	NA
85	Dibenzo(a,i)pyrene	NA	132	N-Nitrosomorpholine	10
86	m-Dichlorobenzene	2	133	N-Nitrosopiperidine	10
87	o-Dichlorobenzene	2	134	N-Nitrosopyrrolidine	10
88	p-Dichlorobenzene	2	135	5-Nitro-o-toluidine	NA
89	3,3'-Dichlorobenzidine	10	136	Pentachlorobenzene	10
90	2,4-Dichlorophenol	5	137	Pentachloroethene	10
91	2,6-Dichlorophenol	5	138	Pentachloronitrobenzene	10
92	Diethyl phthalate	2	139	Pentachlorophenol	50
93	3,3'-Dimethoxybenzidine	10	140	Phenacetin	2
94	p-Dimethylaminoazobenzene	5	141	Penanthrene	2
95	3,3'-Dimethylbenzidine	NA	142	Phenol	2
96	2,4-Dimethylphenol	5	143	2-Picoline	20

Table 6-3 (continued)

BOAT constituent	Detection limit	BOAT constituent	Detection limit
Semivolatiles (continued):	(ppm)	Metals:	(ppm)
144 Pronamide	10	154 Antimony	6.0
145 Pyrene	2	155 Arsenic	0.2
146 Resorcinol	NA	156 Barium	0.9
147 Safrole	NA	157 Beryllium	0.1
148 1,2,4,5-Tetrachlorobenzene	5	158 Cadmium	0.3
149 2,3,4,8-Tetrachlorophenol	10	159 Chromium	0.9
150 1,2,4-Trichlorobenzene	5	159 Chromium, hexavalent	0.2
151 2,4,5-Trichlorophenol	10	160 Copper	1.0
152 2,4,6-Trichlorophenol	10	161 Lead	0.2
153 Tris(2,3-dibromopropyl)phosphate	NA	162 Mercury	0.05
* 7,12-Dimethylbenz(a)anthracene	5	163 Nickel	2.0
* alpha,alpha-Dimethylphenethylamine	10	164 Selenium	0.5
* Benzoic acid	50	165 Silver	0.9
* Benzyl alcohol	5	166 Thallium	0.2
* 4-Chlorophenyl phenyl ether	5	167 Vanadium	2.0
* Dibenzofuran	2	168 Zinc	0.6
* Dibenzo(a,h)pyrene	NA		
* Isophorone	2	Other constituents:	(ppm)
* 2-Methylnaphthalene	2		
* 2-Nitroaniline	10	168 Total cyanide	0.47
* 3-Nitroaniline	10	170 Fluoride	2
* 2-Nitrophenol	10	171 Sulfide	50
* N-Nitrosodiphenylamine	2		
		Physical parameters:	(ppm)
		Paint Filter Test (% free liquid)	0.5
		Total Solids (% residue)	0.05

NA - The standard is not available; the compound was searched using an NBS library data base of 42,000 compounds.

* This constituent is not on the list of constituents in the Generic Quality Assurance Project Plan for Disposal Restrictions Program ("BOAT"), EPA/530-SW-87-011, March 1987. It is a ground-water monitoring constituent as listed in Appendix IX, Page 28839, of the Federal Register, Vol. 51, No. 142.

[a] The compound appears in the Generic Quality Assurance Project Plan as a semivolatile constituent but was analyzed as a volatile constituent.

[b] The compound appears in the Generic Quality Assurance Project Plan as a volatile constituent but was analyzed as a semivolatile constituent.

Source: Onsite Engineering Report for K019.

Table S-4 Combustion Gas Scrubber Discharge Water BDAT List Constituent Detection Limits for K019

	BDAT constituent	Detection limit		BDAT constituent	Detection limit
	Volatile constituents:	(ppb)		Volatile constituents:	(ppb)
1	Acetonitrile	10	32	Iodomethane	2
2	Acrolein	100	33	Isobutyl alcohol	2
3	Acrylonitrile	10	34	Methyl ethyl ketone	10
4	Benzene	2	35	Methyl methacrylate	2
5	Bromodichloromethane	2	37	Methylacrylonitrile	10
6	Bromomethane	2	38	Methylene chloride	10
7	Carbon tetrachloride	2	40	1,1,1,2-Tetrachloroethane	2
8	Carbon disulfide	NA	41	1,1,2,2-Tetrachloroethane	2
9	Chlorobenzene	2	42	Tetrachloroethene	2
10	2-Chloro-1,3-butadiene	2	43	Toluene	2
11	Chlorodibromomethane	2	44	Tribromomethane	2
12	Chloroethane	2	45	1,1,1-Trichloroethane	2
13	2-Chloroethyl vinyl ether	NA	46	1,1,2-Trichloroethane	2
14	Chloroform	2	47	Trichloroethene	2
15	Chloromethane	2	48	Trichloromonofluoromethane	2
16	3-Chloropropane	2	49	1,2,3-Trichloropropane	5
17	1,2-Dibromo-3-chloropropane	2	50	Vinyl chloride	2
18	1,2-Dibromoethane	2	79	3-Chloropropionitrile[a]	NA
19	Dibromomethane	2	*	Acetone	10
20	Trans-1,4-dichloro-2-butane	10	*	Allyl alcohol	NA
21	Dichlorodifluoromethane	2	*	Ethyl benzene	2
22	1,1-Dichloroethane	2	*	Ethylene oxide	NA
23	1,2-Dichloroethane	2	*	2-Hexanone	10
24	1,1-Dichloroethylene	2	*	Malononitrile	NA
25	Trans-1,2-dichloroethane	2	*	4-Methyl-2-pentanone	10
26	1,2-Dichloropropane	2	*	2-Propyn-1-ol	NA
27	Trans-1,3-dichloropropane	2	*	Styrene	2
28	cis-1,3-Dichloropropane	2	*	Trichloromethanethiol	NA
29	1,4-Dioxane	NA	*	Vinly acetate	2
30	Ethyl cyanide	100	*	Xylene (total)	2
31	Ethyl methacrylate	2			

Table 6-4 (continued)

BDAT constituent		Detection limit	BDAT constituent		Detection limit
Semivolatile constituents:		(ppb)	Semivolatile constituents:		(ppb)
38	Methyl methanesulfonate[b]	10	97	Dimethyl phthalate	2
39	Pyridine[b]	20	98	Di-n-butyl phthalate	2
51	Acenaphthalene	2	99	1,4-Dinitrobenzene	10
52	Acenaphthane	2	100	4,5-Dinitro-o-cresol	50
53	Acetophenane	2	101	2,4-Dinitrophenol	50
54	2-Acetylaminofluorene	NA	102	2,4-Dinitrotoluene	50
55	4-Aminobiphenyl	2	103	2,5-Dinitrotoluene	10
56	Aniline	5	104	Di-n-octyl phthalate	2
57	Anthracene	2	105	Di-n-propylnitrosamine	5
58	Aramite	NA	106	Diphenylamine	2
59	Benz(a)anthracene	2	107	1,2-Diphenylhydrazine	2
60	Benzenethiol	NA	108	Fluoranthene	2
61	Benzidine	2	109	Fluorene	2
62	Benzo(a)pyrene	2	110	Hexachlorobenzene	10
63	Benzo(b)fluoranthene	NA	111	Hexachlorobutadiene	10
64	Benzo(g,h,i)perylene	5	112	Hexachlorocyclopentadiene	10
65	Benzo(k)fluoranthene	2	113	Hexachloroethane	10
66	p-Benzoquinone	NA	114	Hexachlorophene	NA
67	Bis(2-chloroethoxy)ethane	2	115	Hexachloropropane	10
68	Bis(2-chloroethyl)ether	2	116	Indeno(1,2,3-c,d)pyrene	5
69	Bis(2-chloroisopropyl)ether	2	117	Isosafrole	NA
70	Bis(2-ethylexyl)phthalate	2	118	Methapyrilene	NA
71	4-Bromophenyl phenyl ether	10	119	3-Methylcholanthrene	NA
72	Butyl benzyl phthalate	2	120	4,4'-Methylenabis(2-chloroaniline)	NA
73	2-sec-Butyl-4,6-dinitrophenol	NA	121	Naphthelene	2
74	p-Chloroaniline	5	122	1,4-Naphthoquinone	2
75	Chlorobenzilate	NA	123	1-Naphthylamine	2
76	p-Chloro-a-cresol	5	124	2-Naphthylamine	2
77	2-Chloronaphthalene	2	125	p-Nitroaniline	10
78	2-Chlorophenol	2	126	Nitrobenzene	5
80	Chrysene	2	127	4-Nitrophenol	10
81	ortho-Cresol	2	128	N-Nitrosodi-n-butylamine	5
82	para-Cresol	2	129	N-Nitrosodiethylamine	10
83	Dibenz(a,h)anthracene	2	130	N-Nitrosodimethylamine	20
84	Dibenzo(a,e)pyrene	NA	131	N-Nitrosomethylethylamine	NA
85	Dibenzo(a,i)pyrene	NA	132	N-Nitrosomorpholine	10
86	m-Dichlorobenzene	2	133	N-Nitrosopiperidine	10
87	o-Dichlorobenzene	2	134	N-Nitrosopyrrolidine	10
88	p-Dichlorobenzene	2	135	5-Nitro-o-toluidine	NA
89	3,3'-Dichlorobenzidine	10	136	Pentachlorobenzene	10
90	2,4-Dichlorophenol	5	137	Pentachloroethene	10
91	2,6-Dichlorophenol	5	138	Pentachloronitrobenzene	10
92	Diethyl phthalate	2	139	Pentachlorophenol	50
93	3,3'-Dimethoxybenzidine	10	140	Phenacetin	2
94	p-Dimethylaminoazobenzene	5	141	Penanthrene	2
95	3,3'-Dimethylbenzidine	NA	142	Phenol	2
96	2,4-Dimethylphenol	5	143	2-Picoline	20

Table 6-4 (continued)

BDAT constituent		Detection limit	BDAT constituent		Detection limit
Semivolatiles (continued):		(ppb)	Metals:		(ppb)
144	Pronamide	10	154	Antimony	240
145	Pyrene	2	155	Arsenic	2
146	Resorcinol	NA	156	Barium	9
147	Safrole	NA	157	Beryllium	1
148	1,2,4,5-Tetrachlorobenzene	5	158	Cadmium	3
149	2,3,4,8-Tetrachlorophenol	10	159	Chromium	9
150	1,2,4-Trichlorobenzene	5	159	Chromium, hexavalent	200
151	2,4,5-Trichlorophenol	10	160	Copper	10
152	2,4,6-Trichlorophenol	10	161	Lead	80
153	Tris(2,3-dibromopropyl)phosphate	NA	162	Mercury	0.2
*	7,12-Dimethylbenz(a)anthracene	5	163	Nickel	20
*	alpha,alpha-Dimethylphenethylamine	10	164	Selenium	25
*	Benzoic acid	50	165	Silver	9
*	Benzyl alcohol	5	166	Thallium	2
*	4-Chlorophenyl phenyl ether	5	167	Vanadium	20
*	Dibenzofuran	2	168	Zinc	6
*	Dibenzo(a,h)pyrene	NA			
*	Isophorone	2	Other constituents:		(ppb)
*	2-Methylnaphthalene	2			
*	2-Nitroaniline	10	168	Total cyanide	10
*	3-Nitroaniline	10	170	Fluoride	5
*	2-Nitrophenol	10	171	Sulfide	1,000
*	N-Nitrosodiphenylamine	2			
			Physical parameters:		(ppb)
				Total Solids (% residue)	0.05

NA - The standard is not available; the compound was searched using an NBS library data base of 42,000 compounds.

* This constituent is not on the list of constituents in the Generic Quality Assurance Project Plan for Disposal Restrictions Program ("BDAT"), EPA/530-SW-87-011, March 1987. It is a ground-water monitoring constituent as listed in Appendix IX, Page 28839, of the Federal Register, Vol. 51, No. 142.

[a] The compound appears in the Generic Quality Assurance Project Plan as a semivolatile constituent but was analyzed as a volatile constituent.

[b] The compound appears in the Generic Quality Assurance Project Plan as a volatile constituent but was analyzed as a semivolatile constituent.

Source: Onsite Engineering Report for KO19.

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USEPA. 1988i. U.S. Environmental Protection Agency, Office of Solid Waste. Best demonstrated available technology (BDAT) background document for K022 waste. Washington, D.C.: U.S. Environmental Protection Agency.

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APPENDIX A

EPA-Collected Detection Limit Data for Nonwastewater and Wastewater Forms of F and K waste with Halogenated Aliphatic Constituents Treated by Incineration (ppm)

Appendix A. EPA Collected Data for the Nonwastewater Forms of F and K wastes with Halogenated Aliphatic Constituents Treated by Incineration

(mg/kg)

Waste code	Constituent	Concentration of constituent in untreated K and F waste (mg/kg)	Detection limits (ppm) F024 Samp.1	Samp.2	Samp.3	Samp.4	Samp.5	Samp.6
U044	Chloroform	NP	0.005	0.005	0.005	0.005	0.005	0.005
U074	1,4-Dichloro-2-butene (T)	NP	0.1	0.1	0.1	0.1	0.1	0.1
U076	1,1-Dichloroethane	NP	0.005	0.005	0.005	0.005	0.005	0.005
U077	1,2-Dichloroethane	<10,000 - 11,000	0.005	0.005	0.005	0.005	0.005	0.005
U078	1,1-Dichloroethylene	NP	0.005	0.005	0.005	0.005	0.005	0.005
U079	1,2-Dichloroethylene (T)	NP	0.005	0.005	0.005	0.005	0.005	0.005
U080	Methylene Chloride	NP	0.005	0.005	0.005	0.005	0.005	0.005
U083	1,2-Dichloropropane	NP	0.005	0.005	0.005	0.005	0.005	0.005
U084	1,3-Dichloropropene (C)	NP	0.005	0.005	0.005	0.005	0.005	0.005
U084	1,3-Dichloropropene (T)	NP	0.005	0.005	0.005	0.005	0.005	0.005
U131	Hexachloroethane	<189 - 0.44	0.333	0.333	0.351	0.333	0.333	0.333
U184	Pentachloroethane	NP	0.333	0.333	0.351	0.333	0.333	0.333
U208	1,1,1,2-tetrachloroethane	NP	0.005	0.005	0.005	0.005	0.005	0.005
U209	1,1,2,2-tetrachloroethane	NP	0.005	0.005	0.005	0.005	0.005	0.005
U210	Tetrachloroethylene	<10,000 - 0.3	0.005	0.005	0.005	0.005	0.005	0.005
U211	Carbon Tetrachloride	NP	0.005	0.005	0.005	0.005	0.005	0.005
U226	1,1,1-Trichloroethane	NP	0.005	0.005	0.005	0.005	0.005	0.005
U227	1,1,2-Trichloroethane	<10,000 - 860	0.005	0.005	0.005	0.005	0.005	0.005
U228	Trichloroethylene	NP	0.005	0.005	0.005	0.005	0.005	0.005
U243	Hexachloropropene	NP	0.666	0.666	0.702	0.666	0.666	0.666

C - Cis Isomer

T - Trans Isomer

NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1989a

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated K and F Waste (mg/kg)	Detection limits (ppm) K001 (PCP) Samp.1	Samp.2	Samp.3
U044	Chloroform	NP	10.0	10.0	10.0
U074	1,4-Dichloro-2-butene (T)	NP	0.25	0.25	0.25
U076	1,1-Dichloroethane	NP	10.0	10.0	10.0
U077	1,2-Dichloroethane	NP	10.0	10.0	10.0
U078	1,1-Dichloroethylene	NP	10.0	10.0	10.0
U079	1,2-Dichloroethylene (T)	NP	10.0	10.0	10.0
U080	Methylene Chloride	NP	50.0	50.0	50.0
U083	1,2-Dichloropropane	NP	25.0	25.0	25.0
U084	1,3-Dichloropropene (C)	NP	25.0	25.0	25.0
U084	1,3-Dichloropropene (T)	NP	25.0	25.0	25.0
U131	Hexachloroethane	NP	2.5	2.5	2.5
U184	Pentachloroethane	NP	2.5	2.5	2.5
U208	1,1,1,2-tetrachloroethane	NP	10.0	10.0	10.0
U209	1,1,2,2-tetrachloroethane	NP	10.0	10.0	10.0
U210	Tetrachloroethylene	NP	10.0	10.0	10.0
U211	Carbon Tetrachloride	NP	10.0	10.0	10.0
U226	1,1,1-Trichloroethane	NP	10.0	10.0	10.0
U227	1,1,2-Trichloroethane	NP	10.0	10.0	10.0
U228	Trichloroethylene	NP	10.0	10.0	10.0
U243	Hexachloropropene	NP	2.5	2.5	2.5

C - Cis Isomer

T - Trans Isomer

NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1987b
USEPA 1988f

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated K and F waste (mg/kg)	Detection limits (ppm) K001 (creosote) Samp.1	Samp.2	Samp.3	Samp.4	Samp.5	Samp.6	Samp.7
U044	Chloroform	NP	10.0	10.0	10.0	10.0	10.0	10.0	10.0
U074	1,4-Dichloro-2-butene (T)	NP	10.0	10.0	10.0	10.0	10.0	10.0	10.0
U076	1,1-Dichloroethane	NP	10.0	10.0	10.0	10.0	10.0	10.0	10.0
U077	1,2-Dichloroethane	NP	10.0	10.0	10.0	10.0	10.0	10.0	10.0
U078	1,1-Dichloroethylene	NP	10.0	10.0	10.0	10.0	10.0	10.0	10.0
U079	1,2-Dichloroethylene (T)	NP	10.0	10.0	10.0	10.0	10.0	10.0	10.0
U080	Methylene Chloride	NP	50.0	50.0	50.0	50.0	50.0	50.0	50.0
U083	1,2-Dichloropropane	NP	10.0	10.0	10.0	10.0	10.0	10.0	10.0
U084	1,3-Dichloropropene (C)	NP	10.0	10.0	10.0	10.0	10.0	10.0	10.0
U084	1,3-Dichloropropene (T)	NP	10.0	10.0	10.0	10.0	10.0	10.0	10.0
U131	Hexachloroethane	NP	0.11	0.11	0.11	0.11	0.11		
U184	Pentachloroethane	NP	0.13	0.13	0.13	0.13	0.13		
U208	1,1,1,2-tetrachloroethane	NP	10.0	10.0	10.0	10.0	10.0	10.0	10.0
U209	1,1,2,2-tetrachloroethane	NP	10.0	10.0	10.0	10.0	10.0	10.0	10.0
U210	Tetrachloroethylene	NP	10.0	10.0	10.0	10.0	10.0	10.0	10.0
U211	Carbon Tetrachloride	NP	10.0	10.0	10.0	10.0	10.0	10.0	10.0
U226	1,1,1-Trichloroethane	NP	10.0	10.0	10.0	10.0	10.0	10.0	10.0
U227	1,1,2-Trichloroethane	NP	10.0	10.0	10.0	10.0	10.0	10.0	10.0
U228	Trichloroethylene	NP	10.0	10.0	10.0	10.0	10.0	10.0	10.0
U243	Hexachloropropene	NP	0.38	0.38	0.38	0.38	0.38		

C - Cis Isomer

T - Trans Isomer

NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1987b
USEPA 1988f

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated K and F waste (mg/kg)	Detection limits (ppm) K011/K013/K014 Samp.1	Samp.2	Samp.3	Samp.4	Samp.5	Samp.6	Samp.7
U044	Chloroform	0.030-0.38	2.0	2.0	2.0	2.0	2.0	2.0	2.0
U074	1,4-Dichloro-2-butene (T)	NP	50	50	50	50	50	50	50
U076	1,1-Dichloroethane	NP	2.0	2.0	2.0	2.0	2.0	2.0	2.0
U077	1,2-Dichloroethane	NP	2.0	2.0	2.0	2.0	2.0	2.0	2.0
U078	1,1-Dichloroethylene	NP	2.0	2.0	2.0	2.0	2.0	2.0	2.0
U079	1,2-Dichloroethylene (T)	NP	2.0	2.0	2.0	2.0	2.0	2.0	2.0
U080	Methylene Chloride	0.023-0.24	50	50	50	50	50	50	50
U083	1,2-Dichloropropane	NP	5.0	5.0	5.0	5.0	5.0	5.0	5.0
U084	1,3-Dichloropropene (C)	NP	5.0	5.0	5.0	5.0	5.0	5.0	5.0
U084	1,3-Dichloropropene (T)	NP	5.0	5.0	5.0	5.0	5.0	5.0	5.0
U131	Hexachloroethane	NP	10	10	10	10	10	10	10
U184	Pentachloroethane	NP	10	10	10	10	10	10	10
U208	1,1,1,2-tetrachloroethane	NP	ND	ND	ND	ND	ND	ND	ND
U209	1,1,2,2-tetrachloroethane	NP	2.0	2.0	2.0	2.0	2.0	2.0	2.0
U210	Tetrachloroethylene	NP	2.0	2.0	2.0	2.0	2.0	2.0	2.0
U211	Carbon Tetrachloride	NP	2.0	2.0	2.0	2.0	2.0	2.0	2.0
U226	1,1,1-Trichloroethane	0.02-0.045	2.0	2.0	2.0	2.0	2.0	2.0	2.0
U227	1,1,2-Trichloroethane	NP	2.0	2.0	2.0	2.0	2.0	2.0	2.0
U228	Trichloroethylene	0.014-0.019	2.0	2.0	2.0	2.0	2.0	2.0	2.0
U243	Hexachloropropene	NP	10	10	10	10	10	10	10

C - Cis Isomer

T - Trans Isomer

ND - No data available

NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1988p

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated K and F waste (mg/kg)	Detection limits (ppm) K015 Samp.1	Samp.2	Samp.3	Samp.4	Samp.5	Samp.6
U044	Chloroform	NP						
U074	1,4-Dichloro-2-butene (T)	NP						
U076	1,1-Dichloroethane	NP						
U077	1,2-Dichloroethane	NP						
U078	1,1-Dichloroethylene	NP						
U079	1,2-Dichloroethylene (T)	NP						
U080	Methylene Chloride	NP						
U083	1,2-Dichloropropane	NP						
U084	1,3-Dichloropropene (C)	NP						
U084	1,3-Dichloropropene (T)	NP						
U131	Hexachloroethane	NP	NO ASH GENERATED					
U184	Pentachloroethane	NP						
U208	1,1,1,2-tetrachloroethane	NP						
U209	1,1,2,2-tetrachloroethane	NP						
U210	Tetrachloroethylene	NP						
U211	Carbon Tetrachloride	NP						
U226	1,1,1-Trichloroethane	NP						
U227	1,1,2-Trichloroethane	NP						
U228	Trichloroethylene	NP						
U243	Hexachloropropene	NP						

C - Cis Isomer

T - Trans Isomer

NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1987c
USEPA 1988g

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated K and F waste (mg/kg)	Detection limits (ppm) K019 Samp.1	Samp.2	Samp.3	Samp.4	Samp.5	Samp.6
U044	Chloroform	4,600-6,000	2.0	2.0	2.0	2.0	2.0	2.0
U074	1,4-Dichloro-2-butene (T)	NP	10.0	10.0	10.0	10.0	10.0	10.0
U076	1,1-Dichloroethane	<2,000-2,200	2.0	2.0	2.0	2.0	2.0	2.0
U077	1,2-Dichloroethane	87,000-130,000	2.0	2.0	2.0	2.0	2.0	2.0
U078	1,1-Dichloroethylene	NP	2.0	2.0	2.0	2.0	2.0	2.0
U079	1,2-Dichloroethylene (T)	NP	2.0	2.0	2.0	2.0	2.0	2.0
U080	Methylene Chloride	NP	10.0	10.0	10.0	10.0	10.0	10.0
U083	1,2-Dichloropropane	NP	5.0	5.0	5.0	5.0	5.0	5.0
U084	1,3-Dichloropropene (C)	NP	5.0	5.0	5.0	5.0	5.0	5.0
U084	1,3-Dichloropropene (T)	NP	5.0	5.0	5.0	5.0	5.0	5.0
U131	Hexachloroethane	85-120	10.0	10.0	10.0	10.0	10.0	10.0
U184	Pentachloroethane	NP	10.0	10.0	10.0	10.0	10.0	10.0
U208	1,1,1,2-tetrachloroethane	NP	2.0	2.0	2.0	2.0	2.0	2.0
U209	1,1,2,2-tetrachloroethane	NP	2.0	2.0	2.0	2.0	2.0	2.0
U210	Tetrachloroethylene	6,000-7,800	2.0	2.0	2.0	2.0	2.0	2.0
U211	Carbon Tetrachloride	3,500-4,100	2.0	2.0	2.0	2.0	2.0	2.0
U226	1,1,1-Trichloroethane	33,000-81,000	2.0	2.0	2.0	2.0	2.0	2.0
U227	1,1,2-Trichloroethane	NP	2.0	2.0	2.0	2.0	2.0	2.0
U228	Trichloroethylene	2,200-3,210	2.0	2.0	2.0	2.0	2.0	2.0
U243	Hexachloropropene	NP	10.0	10.0	10.0	10.0	10.0	10.0

C - Cis Isomer

T - Trans Isomer

NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1988h
USEPA 1988m

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated K and F waste (mg/kg)	Detection limits (ppm) K022 (Plant 1) Samp.1	Samp.2	Samp.3	Samp.4	Samp.5	Samp.6
U044	Chloroform		0.0115	0.0115	0.015	0.0115	0.0115	0.0115
U074	1,4-Dichloro-2-butene (T)		0.090	0.909	0.090	0.090	0.090	0.090
U076	1,1-Dichloroethane		0.0155	0.0155	0.0155	0.0155	0.0155	0.0155
U077	1,2-Dichloroethane		0.0135	0.0135	0.0135	0.0135	0.0135	0.0135
U078	1,1-Dichloroethylene		0.011	0.011	0.011	0.011	0.011	0.011
U079	1,2-Dichloroethylene (T)		0.010	0.010	0.010	0.010	0.010	0.010
U080	Methylene Chloride	[untreated data	0.008	0.008	0.008	0.008	0.008	0.008
U083	1,2-Dichloropropane	is CBI]	0.015	0.015	0.015	0.015	0.015	0.015
U084	1,3-Dichloropropene (C)		0.0135	0.0135	0.0135	0.0135	0.0135	0.0135
U084	1,3-Dichloropropene (T)		0.0145	0.0145	0.0145	0.0145	0.0145	0.0145
U131	Hexachloroethane		0.80	1.59	0.79	0.77	0.78	0.79
U184	Pentachloroethane		0.80	1.60	0.79	0.79	0.784	0.79
U208	1,1,1,2-tetrachloroethane		0.018	0.108	0.108	0.018	0.018	0.018
U209	1,1,2,2-tetrachloroethane		0.0115	0.0115	0.0115	0.0115	0.0115	0.0115
U210	Tetrachloroethylene		0.017	0.017	0.017	0.017	0.017	0.017
U211	Carbon Tetrachloride		0.016	0.016	0.016	0.016	0.016	0.016
U226	1,1,1-Trichloroethane		0.013	0.013	0.013	0.013	0.013	0.013
U227	1,1,2-Trichloroethane		0.0115	0.0115	0.0115	0.0115	0.0115	0.0115
U228	Trichloroethylene		0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
U243	Hexachloropropene		7.0	13.99	6.93	6.93	6.93	6.93

C - Cis Isomer

T - Trans Isomer

CBI - Confidential Business Information

Source: USEPA 1988i

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated K and F waste (mg/kg)	Detection limits (ppm) K022 (Plant 2) Samp.1	Samp.2	Samp.3	Samp.4	Samp.5	Samp.6
U044	Chloroform		0.0115	0.0115	0.0115	0.0115	0.0115	0.0115
U074	1,4-Dichloro-2-butene (T)		0.09	0.09	0.09	0.09	0.09	0.09
U076	1,1-Dichloroethane		0.155	0.155	0.155	0.155	0.155	0.155
U077	1,2-Dichloroethane		0.135	0.135	0.135	0.135	0.135	0.135
U078	1,1-Dichloroethylene		0.011	0.011	0.011	0.011	0.011	0.011
U079	1,2-Dichloroethylene (T)		0.010	0.010	0.010	0.010	0.010	0.010
U080	Methylene Chloride	[untreated data	0.008	0.008	0.008	0.008	0.008	0.008
U083	1,2-Dichloropropane	is CBI]	0.015	0.015	0.015	0.015	0.015	0.015
U084	1,3-Dichloropropene (C)		0.135	0.135	0.135	0.135	0.135	0.135
U084	1,3-Dichloropropene (T)		0.145	0.145	0.145	0.145	0.145	0.145
U131	Hexachloroethane		0.264	0.264	0.264	0.264	0.264	0.264
U184	Pentachloroethane		0.264	0.264	0.264	0.264	0.264	0.264
U208	1,1,1,2-tetrachloroethane		0.018	0.108	0.108	0.018	0.018	0.018
U209	1,1,2,2-tetrachloroethane		0.115	0.115	0.115	0.115	0.115	0.115
U210	Tetrachloroethylene		0.017	0.017	0.017	0.017	0.017	0.017
U211	Carbon Tetrachloride		0.016	0.016	0.016	0.016	0.016	0.016
U226	1,1,1-Trichloroethane		0.013	0.013	0.013	0.013	0.013	0.013
U227	1,1,2-Trichloroethane		0.115	0.115	0.115	0.115	0.115	0.115
U228	Trichloroethylene		0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
U243	Hexachloropropene		2.310	2.310	2.310	2.310	2.310	2.310

C - Cis Isomer

T - Trans Isomer

CBI - Confidential Business Information

Source: USEPA 1988i

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated K and F waste (mg/kg)	Detection limits (ppm) K024 Samp.1	Samp.2	Samp.3
U044	Chloroform	NP	10.0	10.0	10.0
U074	1,4-Dichloro-2-butene (T)	NP	ND	ND	ND
U076	1,1-Dichloroethane	NP	10.0	10.0	10.0
U077	1,2-Dichloroethane	NP	10.0	10.0	10.0
U078	1,1-Dichloroethylene	NP	10.0	10.0	10.0
U079	1,2-Dichloroethylene (T)	NP	10.0	10.0	10.0
U080	Methylene Chloride	NP	250.0	250.0	250.0
U083	1,2-Dichloropropane	NP	25.0	25.0	25.0
U084	1,3-Dichloropropene (C)	NP	25.0	25.0	25.0
U084	1,3-Dichloropropene (T)	NP	25.0	25.0	25.0
U131	Hexachloroethane	NP	2.5	2.5	2.5
U184	Pentachloroethane	NP	2.5	2.5	2.5
U208	1,1,1,2-tetrachloroethane	NP	10.0	10.0	10.0
U209	1,1,2,2-tetrachloroethane	NP	10.0	10.0	10.0
U210	Tetrachloroethylene	NP	10.0	10.0	10.0
U211	Carbon Tetrachloride	NP	10.0	10.0	10.0
U226	1,1,1-Trichloroethane	NP	10.0	10.0	10.0
U227	1,1,2-Trichloroethane	NP	10.0	10.0	10.0
U228	Trichloroethylene	NP	10.0	10.0	10.0
U243	Hexachloropropene	NP	2.5	2.5	2.5

C - Cis Isomer
T - Trans Isomer
ND - No data available
NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1987a
USEPA 1988a

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated K and F waste (mg/kg)	Detection limits (ppm) K037 Samp.1	Samp.2	Samp.3	Samp.4	Samp.5	Samp.6	Samp.7
U044	Chloroform	NP	20	20	20	20	20	20	20
U074	1,4-Dichloro-2-butene (T)	NP	500	500	500	500	500	500	500
U076	1,1-Dichloroethane	NP	20	20	20	20	20	20	20
U077	1,2-Dichloroethane	NP	20	20	20	20	20	20	20
U078	1,1-Dichloroethylene	NP	20	20	20	20	20	20	20
U079	1,2-Dichloroethylene (T)	NP	20	20	20	20	20	20	20
U080	Methylene Chloride	NP	500	500	500	500	500	500	500
U083	1,2-Dichloropropane	NP	50	50	50	50	50	50	50
U084	1,3-Dichloropropene (C)	NP	50	50	50	50	50	50	50
U084	1,3-Dichloropropene (T)	NP	50	50	50	50	50	50	50
U131	Hexachloroethane	NP	0.40	0.40	0.40	0.40	0.40	0.40	0.40
U184	Pentachloroethane	NP	0.40	0.40	0.40	0.40	0.40	0.40	0.40
U208	1,1,1,2-tetrachloroethane	NP	20	20	20	20	20	20	20
U209	1,1,2,2-tetrachloroethane	NP	20	20	20	20	20	20	20
U210	Tetrachloroethylene	NP	20	20	20	20	20	20	20
U211	Carbon Tetrachloride	NP	20	20	20	20*	20	20	20
U226	1,1,1-Trichloroethane	NP	20	20	20	20	20	20	20
U227	1,1,2-Trichloroethane	NP	20	20	20	20	20	20	20
U228	Trichloroethylene	NP	20	20	20	20	20	20	20
U243	Hexachloropropene	NP	0.40	0.40	0.40	0.40	0.40	0.40	0.40

C - Cis Isomer

T - Trans Isomer

NP - Either not present or not present in concentrations above the detection limit.

*Contained a treated residual above the detection limit.

Source: USEPA 1988b, 1988t.

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated K and F waste (mg/kg)	Detection limits (ppm) K048/K051 Samp.1	Samp.2	Samp.3	Samp.4	Samp.5	Samp.6
U044	Chloroform	NP	2.0	2.0	2.0	2.0	2.0	2.0
U074	1,4-Dichloro-2-butene (T)	NP	10.0	10.0	10.0	10.0	10.0	10.0
U076	1,1-Dichloroethane	NP	2.0	2.0	2.0	2.0	2.0	2.0
U077	1,2-Dichloroethane	NP	2.0	2.0	2.0	2.0	2.0	2.0
U078	1,1-Dichloroethylene	NP	2.0	2.0	2.0	2.0	2.0	2.0
U079	1,2-Dichloroethylene (T)	NP	2.0	2.0	2.0	2.0	2.0	2.0
U080	Methylene Chloride	NP	10.0	10.0	10.0	10.0	10.0	10.0
U083	1,2-Dichloropropane	NP	5.0	5.0	5.0	5.0	5.0	5.0
U084	1,3-Dichloropropene (C)	NP	5.0	5.0	5.0	5.0	5.0	5.0
U084	1,3-Dichloropropene (T)	NP	5.0	5.0	5.0	5.0	5.0	5.0
U131	Hexachloroethane	NP	1.0	1.0	1.0	1.0	1.0	1.0
U184	Pentachloroethane	NP	1.0	1.0	1.0	1.0	1.0	1.0
U208	1,1,1,2-tetrachloroethane	NP	2.0	2.0	2.0	2.0	2.0	2.0
U209	1,1,2,2,-tetrachloroethane	NP	2.0	2.0	2.0	2.0	2.0	2.0
U210	Tetrachloroethylene	NP	2.0	2.0	2.0	2.0	2.0	2.0
U211	Carbon Tetrachloride	NP	2.0	2.0	2.0	2.0	2.0	2.0
U226	1,1,1-Trichloroethane	NP	2.0	2.0	2.0	2.0	2.0	2.0
U227	1,1,2-Trichloroethane	NP	2.0	2.0	2.0	2.0	2.0	2.0
U228	Trichloroethylene	NP	2.0	2.0	2.0	2.0	2.0	2.0
U243	Hexachloropropene	NP	1.0	1.0	1.0	1.0	1.0	1.0

C - Cis Isomer

T - Trans Isomer

NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1987d
USEPA 1988j

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated K and F waste (mg/kg)	Detection limits (ppm) K086 Samp.1	Samp.2	Samp.3	Samp.4	Samp.5	Samp.6
U044	Chloroform							
U074	1,4-Dichloro-2-butene (T)							
U076	1,1-Dichloroethane							
U077	1,2-Dichloroethane							
U078	1,1-Dichloroethylene							
U079	1,2-Dichloroethylene (T)							
U080	Methylene Chloride							
U083	1,2-Dichloropropane							
U084	1,3-Dichloropropene (C)							
U084	1,3-Dichloropropene (T)							
U131	Hexachloroethane	[untreated data	NO ASH DATA					
U184	Pentachloroethane	is CBI]						
U208	1,1,1,2-tetrachloroethane							
U209	1,1,2,2-tetrachloroethane							
U210	Tetrachloroethylene							
U211	Carbon Tetrachloride							
U226	1,1,1-Trichloroethane							
U227	1,1,2-Trichloroethane							
U228	Trichloroethylene							
U243	Hexachloropropene							

C - Cis Isomer

T - Trans Isomer

CBI - Confidential Business Information

Source: USEPA 1988c

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated K and F waste (mg/kg)	Detection limits (ppm) K087 Samp.1	Samp.2	Samp.3	Samp.4	Samp.5
U044	Chloroform	NP	0.025	0.025	0.025	0.025	0.025
U074	1,4-Dichloro-2-butene (T)	NP	0.500	0.500	0.500	0.500	0.500
U076	1,1-Dichloroethane	NP	0.025	0.025	0.025	0.025	0.025
U077	1,2-Dichloroethane	NP	0.025	0.025	0.025	0.025	0.025
U078	1,1-Dichloroethylene	NP	0.025	0.025	0.025	0.025	0.025
U079	1,2-Dichloroethylene (T)	NP	0.025	0.025	0.025	0.025	0.025
U080	Methylene Chloride	NP	0.025	0.025	0.025	0.025	0.025
U083	1,2-Dichloropropane	NP	0.025	0.025	0.025	0.025	0.025
U084	1,3-Dichloropropene (C)	NP	0.025	0.025	0.025	0.025	0.025
U084	1,3-Dichloropropene (T)	NP	0.025	0.025	0.025	0.025	0.025
U131	Hexachloroethane	NP	1.0	1.0	1.0	1.0	1.0
U184	Pentachloroethane	NP	ND	ND	ND	ND	ND
U208	1,1,1,2-tetrachloroethane	NP	0.025	0.025	0.025	0.025	0.025
U209	1,1,2,2-tetrachloroethane	NP	0.025	0.025	0.025	0.025	0.025
U210	Tetrachloroethylene	NP	0.025	0.025	0.025	0.025	0.025
U211	Carbon Tetrachloride	NP	0.025	0.025	0.025	0.025	0.025
U226	1,1,1-Trichloroethane	NP	0.025	0.025	0.025	0.025	0.025
U227	1,1,2-Trichloroethane	NP	0.025	0.025	0.025	0.025	0.025
U228	Trichloroethylene	NP	0.025	0.025	0.025	0.025	0.025
U243	Hexachloropropene	NP	ND	ND	ND	ND	ND

C - Cis Isomer

T - Trans Isomer

ND - No data available

NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1986c

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated K and F waste (mg/kg)	Detection limits (ppm) K101 Samp.1	Samp.2	Samp.3	Samp.4
U044	Chloroform	NP	0.005	0.005	0.005	0.005
U074	1,4-Dichloro-2-butene (T)	NP	0.100	0.100	0.100	0.100
U076	1,1-Dichloroethane	NP	0.005	0.005	0.005	0.005
U077	1,2-Dichloroethane	NP	0.005	0.005	0.005	0.005
U078	1,1-Dichloroethylene	NP	0.005	0.005	0.005	0.00
U079	1,2-Dichloroethylene (T)	NP	0.005	0.005	0.005	0.005
U080	Methylene Chloride	NP	0.005	0.005	0.005	0.005
U083	1,2-Dichloropropane	NP	0.005	0.005	0.005	0.005
U084	1,3-Dichloropropene (C)	NP	0.005	0.005	0.005	0.005
U084	1,3-Dichloropropene (T)	NP	0.005	0.005	0.005	0.005
U131	Hexachloroethane	NP	0.420	0.420	0.420	0.420
U184	Pentachloroethane	NP	ND	ND	ND	ND
U208	1,1,1,2-tetrachloroethane	NP	0.005	0.005	0.005	0.005
U209	1,1,2,2-tetrachloroethane	NP	0.005	0.005	0.005	0.005
U210	Tetrachloroethylene	NP	0.005	0.005	0.005	0.005
U211	Carbon Tetrachloride	NP	0.005	0.005	0.005	0.005
U226	1,1,1-Trichloroethane	NP	0.005	0.005	0.005	0.005
U227	1,1,2-Trichloroethane	NP	0.005	0.005	0.005	0.005
U228	Trichloroethylene	NP	0.005	0.005	0.005	0.005
U243	Hexachloropropene	NP	ND	ND	ND	ND

C - Cis Isomer

T - Trans Isomer

ND - No data available

NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1988e
USEPA 1988n

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated K and F waste (mg/kg)	Detection limits (ppm) K102 Samp.1	Samp.2	Samp.3	Samp.4	Samp.5
U044	Chloroform	NP	1.5	1.5	1.5	1.5	1.5
U074	1,4-Dichloro-2-butene (T)	NP	30.0	30.0	30.0	30.0	30.0
U076	1,1-Dichloroethane	NP	1.5	1.5	1.5	1.5	1.5
U077	1,2-Dichloroethane	NP	1.5	1.5	1.5	1.5	1.5
U078	1,1-Dichloroethylene	NP	1.5	1.5	1.5	1.5	1.5
U079	1,2-Dichloroethylene (T)	NP	1.5	1.5	1.5	1.5	1.5
U080	Methylene Chloride	NP	1.5	1.5	1.5	1.5	1.5
U083	1,2-Dichloropropane	NP	1.5	1.5	1.5	1.5	1.5
U084	1,3-Dichloropropene (C)	NP	1.5	1.5	1.5	1.5	1.5
U084	1,3-Dichloropropene (T)	NP	1.5	1.5	1.5	1.5	1.5
U131	Hexachloroethane	NP	1.0	1.0	1.0	1.0	1.0
U184	Pentachloroethane	NP	ND	ND	ND	ND	ND
U208	1,1,1,2-tetrachloroethane	NP	1.5	1.5	1.5	1.5	1.5
U209	1,1,2,2-tetrachloroethane	NP	1.5	1.5	1.5	1.5	1.5
U210	Tetrachloroethylene	NP	1.5	1.5	1.5	1.5	1.5
U211	Carbon Tetrachloride	NP	1.5	1.5	1.5	1.5	1.5
U226	1,1,1-Trichloroethane	NP	1.5	1.5	1.5	1.5	1.5
U227	1,1,2-Trichloroethane	NP	1.5	1.5	1.5	1.5	1.5
U228	Trichloroethylene	NP	1.5	1.5	1.5	1.5	1.5
U243	Hexachloropropene	NP	ND	ND	ND	ND	ND

C - Cis Isomer

T - Trans Isomer

ND - No data available

NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1988e
USEPA 1988o

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated K and F waste (mg/kg)	Detection limits (ppm) John Zink 1989 Pesticides Test Burn Test 1 Samp.1	Test 1 Samp.2	Test 1 Samp.3	Test 1 Samp.4	Test 2 Samp.1	Test 2 Samp.2	Test 2 Samp.3	Test 2 Samp.4
U044	Chloroform	Test 1 Test 2								
U074	1,4-Dichloro-2-butene (T)	NP NP								
U076	1,1-Dichloroethane	NP NP								
U077	1,2-Dichloroethane	NP NP								
U078	1,1-Dichloroethylene	NP NP								
U079	1,2-Dichloroethylene (T)	NP NP								
U080	Methylene Chloride	87,000 NP	0.010*	0.010	0.010	0.010	0.005	0.010*	0.005*	0.005*
U083	1,2-Dichloropropane	NP NP								
U084	1,3-Dichloropropene (C)	NP NP								
U084	1,3-Dichloropropene (T)	NP NP								
U131	Hexachloroethane	NP NP					0.330	0.310	0.360	0.330
U184	Pentachloroethane									
U208	1,1,1,2-tetrachloroethane	NP NP								
U209	1,1,2,2-tetrachloroethane	NP NP								
U210	Tetrachloroethene	NP <0.010-6,300					0.05	0.010	0.005	0.005
U211	Carbon Tetrachloride	NP 0.017-140,000				0.005*	0.010*	0.005*	0.005*	
U226	1,1,1-Trichloroethane	130,000 NP	0.010	0.010	0.010	0.010				
U227	1,1,2-Trichloroethane	NP NP								
U228	Trichloroethene	NP NP								
U243	Hexachloropropene	NP NP								

C - Cis Isomer

T - Trans Isomer

* - Contained treated residuals above the detection limits

NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1989b

Appendix A. EPA Collected Data for the Wastewater Forms of F and K wastes with Halogenated Aliphatic Constituents Treated by Incineration

mg/l

Waste code	Constituent	Concentration of constituent in untreated waste	Detection limits (ppm) F024					
			Samp.1	Samp.2	Samp.3	Samp.4	Samp.5	Samp.6
U044	Chloroform	NP	0.005	0.005	0.005	0.005	0.005	0.005
U074	1,4-Dichloro-2-butene (T)	NP	0.1	0.1	0.1	0.1	0.1	0.1
U076	1,1-Dichloroethane	NP	0.005	0.005	0.005	0.005	0.005	0.005
U077	1,2-Dichloroethane	<10,000 - 11,000.0	0.005	0.005	0.005	0.005	0.005	0.005
U078	1,1-Dichloroethylene	NP	0.005	0.005	0.005	0.005	0.005	0.005
U079	1,2-Dichloroethylene (T)	NP	0.005	0.005	0.005	0.005	0.005	0.005
U080	Methylene Chloride	NP	0.005	0.005	0.005	0.005	0.005	0.005
U083	1,2-Dichloropropane	NP	0.005	0.005	0.005	0.005	0.005	0.005
U084	1,3-Dichloropropene (C)	NP	0.005	0.005	0.005	0.005	0.005	0.005
U084	1,3-Dichloropropene (T)	NP	0.005	0.005	0.005	0.005	0.005	0.005
U131	Hexachloroethane	<189 - 0.44	0.0116	0.0121	0.0108	0.0104	0.0106	0.0107
U184	Pentachloroethane	NP	0.0116	0.0121	0.0108	0.0104	0.0106	0.0107
U208	1,1,1,2-tetrachloroethane	NP	0.005	0.005	0.005	0.005	0.005	0.005
U209	1,1,2,2-tetrachloroethane	NP	0.005	0.005	0.005	0.005	0.005	0.005
U210	Tetrachloroethylene	<10,000 - 0.3	0.005	0.005	0.005	0.005	0.005	0.005
U211	Carbon Tetrachloride	NP	0.005	0.005	0.005	0.005	0.005	0.005
U226	1,1,1-Trichloroethane	NP	0.005	0.005	0.005	0.005	0.005	0.005
U227	1,1,2-Trichloroethane	<10,000 - 860.0	0.005	0.005	0.005	0.005	0.005	0.005
U228	Trichloroethylene	NP	0.005	0.005	0.005	0.005	0.005	0.005
U243	Hexachloropropene	NP	0.0232	0.024	0.0216	0.0208	0.0212	0.0214

C - Cis Isomer

T - Trans Isomer

NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1989a

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated waste	Detection limit (ppm) K001 (PCP)			
			Samp.1	Samp.2	Samp.3	Samp.4
U044	Chloroform	NP	0.010	0.010	0.010	0.010
U074	1,4-Dichloro-2-butene (T)	NP	0.00025	0.00025	0.00025	0.00025
U076	1,1-Dichloroethane	NP	0.010	0.010	0.010	0.010
U077	1,2-Dichloroethane	NP	0.010	0.010	0.010	0.010
U078	1,1-Dichloroethylene	NP	0.010	0.010	0.010	0.010
U079	1,2-Dichloroethylene (T)	NP	0.010	0.010	0.010	0.010
U080	Methylene Chloride	NP	0.050*	0.050*	0.050*	0.050*
U083	1,2-Dichloropropane	NP	0.025	0.025	0.025	0.025
U084	1,3-Dichloropropene (C)	NP	0.025	0.025	0.025	0.025
U084	1,3-Dichloropropene (T)	NP	0.025	0.025	0.025	0.025
U131	Hexachloroethane	NP	0.050	0.050	0.050	0.050
U184	Pentachloroethane	NP	0.050	0.050	0.050	0.050
U208	1,1,1,2-tetrachloroethane	NP	0.010	0.010	0.010	0.010
U209	1,1,2,2-tetrachloroethane	NP	0.010	0.010	0.010	0.010
U210	Tetrachloroethylene	NP	0.010	0.010	0.010	0.010
U211	Carbon Tetrachloride	NP	0.010	0.010	0.010	0.010
U226	1,1,1-Trichloroethane	NP	0.010	0.010	0.010	0.010
U227	1,1,2-Trichloroethane	NP	0.010	0.010	0.010	0.010
U228	Trichloroethylene	NP	0.010	0.010	0.010	0.010
U243	Hexachloropropene	NP	0.050	0.050	0.050	0.050

C - Cis Isomer

T - Trans Isomer

ND - No data available

NP - Either not present or not present in concentrations above the detection limit.

*Contained treated residuals above the detection limit.

Source: USEPA 1987b
USEPA 1988f

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated waste	Detection limits (ppm) K001 (creosote)						
			Samp.1	Samp.2	Samp.3	Samp.4	Samp.5	Samp.6	Samp.7
U044	Chloroform	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U074	1,4-Dichloro-2-butene (T)	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U076	1,1-Dichloroethane	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U077	1,2-Dichloroethane	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U078	1,1-Dichloroethylene	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U079	1,2-Dichloroethylene (T)	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U080	Methylene Chloride	NP	0.050	0.050	0.050	0.050	0.050	0.050	0.050
U083	1,2-Dichloropropane	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U084	1,3-Dichloropropene (C)	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U084	1,3-Dichloropropene (T)	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U131	Hexachloroethane	NP	0.002	0.002	0.002	0.002	0.002		
U184	Pentachloroethane	NP	0.002	0.002	0.002	0.002	0.002		
U208	1,1,1,2-tetrachloroethane	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U209	1,1,2,2,-tetrachloroethane	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U210	Tetrachloroethylene	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U211	Carbon Tetrachloride	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U226	1,1,1-Trichloroethane	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U227	1,1,2-Trichloroethane	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U228	Trichloroethylene	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U243	Hexachloropropene	NP	0.006	0.006	0.006	0.006	0.006		

C - Cis Isomer

T - Trans Isomer

NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1987b
USEPA 1988f

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated waste	Detection limits (ppm) K011/K013/K014 Samp.1	Samp.2
U044	Chloroform	0.030-0.39	0.0003*	ND
U074	1,4-Dichloro-2-butene (T)	NP	0.0005	ND
U076	1,1-Dichloroethane	NP	0.00056	ND
U077	1,2-Dichloroethane	NP	0.00056	ND
U078	1,1-Dichloroethylene	NP	0.00094	ND
U079	1,2-Dichloroethylene (T)	NP	0.0003	ND
U080	Methylene Chloride	0.023-0.24	0.00056*	ND
U083	1,2-Dichloropropane	NP	0.0012	ND
U084	1,3-Dichloropropene (C)	NP	0.001	ND
U084	1,3-Dichloropropene (T)	NP	0.001	ND
U131	Hexachloroethane	NP	0.010	0.010
U184	Pentachloroethane	NP	0.010	0.010
U208	1,1,1,2-tetrachloroethane	NP	0.00078	ND
U209	1,1,2,2,-tetrachloroethane	NP	0.00138	ND
U210	Tetrachloroethylene	NP	0.00082	ND
U211	Carbon Tetrachloride	NP	0.00056	ND
U226	1,1,1-Trichloroethane	0.02-0.045	0.00076	ND
U227	1,1,2-Trichloroethane	NP	0.001	ND
U228	Trichloroethylene	0.014-0.019	0.00038	ND
U243	Hexachloropropene	NP	0.010	0.010

C - Cis Isomer

T - Trans Isomer

* - Contained treated residual above the detection limit

NP - Either not present or not present in concentrations above the detection limit.

ND - No data available.

Source: USEPA 1988p

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated waste	Detection limit (ppm) K015 Samp.1	Samp.2	Samp.3	Samp.4
U044	Chloroform	NP	0.010	0.010	0.010	0.010
U074	1,4-Dichloro-2-butene (T)	NP	0.250	0.250	0.250	0.250
U076	1,1-Dichloroethane	NP	0.010	0.010	0.010	0.010
U077	1,2-Dichloroethane	NP	0.010	0.010	0.010	0.010
U078	1,1-Dichloroethylene	NP	0.010	0.010	0.010	0.010
U079	1,2-Dichloroethylene (T)	NP	0.010	0.010	0.010	0.010
U080	Methylene Chloride	NP	0.050	0.050	0.050	0.050
U083	1,2-Dichloropropane	NP	0.025	0.025	0.025	0.025
U084	1,3-Dichloropropene (C)	NP	0.025	0.025	0.025	0.025
U084	1,3-Dichloropropene (T)	NP	0.025	0.025	0.025	0.025
U131	Hexachloroethane	NP	0.050	0.050	0.050	0.050
U184	Pentachloroethane	NP	0.050	0.050	0.050	0.050
U208	1,1,1,2-tetrachloroethane	NP	0.010	0.010	0.010	0.010
U209	1,1,2,2-tetrachloroethane	NP	0.010	0.010	0.010	0.010
U210	Tetrachloroethylene	NP	0.010	0.010	0.010	0.010
U211	Carbon Tetrachloride	NP	0.010	0.010	0.010	0.010
U226	1,1,1-Trichloroethane	NP	0.010	0.010	0.010	0.010
U227	1,1,2-Trichloroethane	NP	0.010	0.010	0.010	0.010
U228	Trichloroethylene	NP	0.010	0.010	0.010	0.010
U243	Hexachloropropene	NP	0.050	0.050	0.050	0.050

C - Cis Isomer

T - Trans Isomer

NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1987c
USEPA 1986g

Appendix A. (Continued)

Waste code	Constituent	Concentration of constitutent in untreated waste	Detection limits (ppm) K019					
			Samp.1	Samp.2	Samp.3	Samp.4	Samp.5	Samp.6
U044	Chloroform	4,600-6,000	0.002	0.002	0.002	0.002	0.002	0.002
U074	1,4-Dichloro-2-butene (T)	NP	0.010	0.010	0.010	0.010	0.010	0.010
U076	1,1-Dichloroethane	<2,000-2,200	0.002	0.002	0.002	0.002	0.002	0.002
U077	1,2-Dichloroethane	87,000-130,000	0.002	0.002	0.002	0.002	0.002	0.002
U078	1,1-Dichloroethylene	NP	0.002	0.002	0.002	0.002	0.002	0.002
U079	1,2-Dichloroethylene (T)	NP	0.002	0.002	0.002	0.002	0.002	0.002
U080	Methylene Chloride	NP	0.010	0.010	0.010	0.010	0.010	0.010
U083	1,2-Dichloropropane	NP	0.020	0.020	0.020	0.020	0.020	0.020
U084	1,3-Dichloropropene (C)	NP	0.020	0.020	0.020	0.020	0.020	0.020
U084	1,3-Dichloropropene (T)	NP	0.020	0.020	0.020	0.020	0.020	0.020
U131	Hexachloroethane	85-120	0.010	0.010	0.010	0.010	0.010	0.010
U184	Pentachloroethane	NP	0.010	0.010	0.010	0.010	0.010	0.010
U208	1,1,1,2-tetrachloroethane	NP	0.002	0.002	0.002	0.002	0.002	0.002
U209	1,1,2,2-tetrachloroethane	NP	0.002	0.002	0.002	0.002	0.002	0.002
U210	Tetrachloroethylene	6,000-7,800	0.002	0.002	0.002	0.002	0.002	0.002
U211	Carbon Tetrachloride	3,500-4,100	0.002	0.002	0.002	0.002	0.002	0.002
U226	1,1,1-Trichloroethane	33,000-81,000	0.002	0.002	0.002	0.002	0.002	0.002
U227	1,1,2-Trichloroethane	NP	0.002	0.002	0.002	0.002	0.002	0.002
U228	Trichloroethylene	2,200-3,210	0.002	0.002	0.002	0.002	0.002	0.002
U243	Hexachloropropene	NP	0.010	0.010	0.010	0.010	0.010	0.010

C - Cis Isomer

T - Trans Isomer

NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1988h
USEPA 1988m

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated waste	Detection limits (ppm) K022
U044	Chloroform	NF	
U074	1,4-Dichloro-2-butene (T)	NF	
U076	1,1-Dichloroethane	NF	
U077	1,2-Dichloroethane	NF	
U078	1,1-Dichloroethylene	NF	
U079	1,2-Dichloroethylene (T)	NF	
U080	Methylene Chloride	[Untreated data	
U083	1,2-Dichloropropane	is CBI for K022]	
U084	1,3-Dichloropropene (C)		NO DATA
U084	1,3-Dichloropropene (T)	NF	
U131	Hexachloroethane	NF	
U184	Pentachloroethane	NF	
U208	1,1,1,2-tetrachloroethane	NF	
U209	1,1,2,2-tetrachloroethane	NF	
U210	Tetrachloroethylene	NF	
U211	Carbon Tetrachloride	NF	
U226	1,1,1-Trichloroethane	NF	
U227	1,1,2-Trichloroethane	NF	
U228	Trichloroethylene	NF	
U243	Hexachloropropene	NF	

C - Cis Isomer

T - Trans Isomer

CBI - Confidential Business Information

NF - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1988i

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated waste	Detection limits (ppm) K024									
			Samp.1	Samp.2	Samp.3	Samp.4	Samp.5	Samp.6	Samp.7	Samp.8	Samp.9	Samp.10
U044	Chloroform	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U074	1,4-Dichloro-2-butene (T)	NP	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
U076	1,1-Dichloroethane	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U077	1,2-Dichloroethane	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U078	1,1-Dichloroethylene	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U079	1,2-Dichloroethylene (T)	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U080	Methylene Chloride	NP	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
U083	1,2-Dichloropropane	NP	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
U084	1,3-Dichloropropene (C)	NP	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
U084	1,3-Dichloropropene (T)	NP	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
U131	Hexachloroethane	NP	0.010	0.010	0.010	ND	ND	ND	ND	ND	ND	ND
U184	Pentachloroethane	NP	0.050	0.050	0.050	ND	ND	ND	ND	ND	ND	ND
U208	1,1,1,2-tetrachloroethane	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U209	1,1,2,2-tetrachloroethane	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U210	Tetrachloroethylene	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U211	Carbon Tetrachloride	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U226	1,1,1-Trichloroethane	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U227	1,1,2-Trichloroethane	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U228	Trichloroethylene	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U243	Hexachloropropene	NP	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050

C - Cis Isomer

T - Trans Isomer

ND - No data available

NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1987q
USEPA 1988a

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated waste	Detection limits (ppm) K037							
			Samp.1	Samp.2	Samp.3	Samp.4	Samp.5	Samp.6	Samp.7	Samp.8
U044	Chloroform	NP	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
U074	1,4-Dichloro-2-butene (T)	NP	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
U076	1,1-Dichloroethane	NP	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
U077	1,2-Dichloroethane	NP	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
U078	1,1-Dichloroethylene	NP	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
U079	1,2-Dichloroethylene (T)	NP	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
U080	Methylene Chloride	NP	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
U083	1,2-Dichloropropane	NP	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
U084	1,3-Dichloropropene (C)	NP	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
U084	1,3-Dichloropropene (T)	NP	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
U131	Hexachloroethane	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U184	Pentachloroethane	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
U208	1,1,1,2-tetrachloroethane	NP	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
U209	1,1,2,2,-tetrachloroethane	NP	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
U210	Tetrachloroethylene	NP	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
U211	Carbon Tetrachloride	NP	0.002	0.002	0.002	0.002*	0.002	0.002	0.002	0.002
U226	1,1,1-Trichloroethane	NP	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
U227	1,1,2-Trichloroethane	NP	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
U228	Trichloroethylene	NP	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
U243	Hexachloropropene	NP	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010

C - Cis Isomer

T - Trans Isomer

NP - Either not present or not present in concentrations above the detection limit.

*Contained treated residual above the detection limit.

Source: USEPA 1988b, 1988t.

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated waste	Detection limits (ppm) K048/K051					
			Samp.1	Samp.2	Samp.3	Samp.4	Samp.5	Samp.6
U044	Chloroform	NP	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042
U074	1,4-Dichloro-2-butene (T)	NP	0.0066	0.0066	0.0066	0.0066	0.0066	0.0066
U076	1,1-Dichloroethane	NP	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041
U077	1,2-Dichloroethane	NP	0.0043	0.0043	0.0043	0.0043	0.0043	0.0043
U078	1,1-Dichloroethylene	NP	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041
U079	1,2-Dichloroethylene (T)	NP	0.0038	0.0038	0.0038	0.0038	0.0038	0.0038
U080	Methylene Chloride	NP	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041
U083	1,2-Dichloropropane	NP	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042
U084	1,3-Dichloropropene (C)	NP	0.0049	0.0049	0.0049	0.0049	0.0049	0.0049
U084	1,3-Dichloropropene (T)	NP	0.0044	0.0044	0.0044	0.0044	0.0044	0.0044
U131	Hexachloroethane	NP	0.010	0.010	0.010	0.010	0.010	0.010
U184	Pentachloroethane	NP	0.010	0.010	0.010	0.010	0.010	0.010
U208	1,1,1,2-tetrachloroethane	NP	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041
U209	1,1,2,2-tetrachloroethane	NP	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040
U210	Tetrachloroethylene	NP	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040
U211	Carbon Tetrachloride	NP	0.0044	0.0044	0.0044	0.0044	0.0044	0.0044
U226	1,1,1-Trichloroethane	NP	0.0043	0.0043	0.0043	0.0043	0.0043	0.0043
U227	1,1,2-Trichloroethane	NP	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051
U228	Trichloroethylene	NP	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040
U243	Hexachloropropene	NP	0.010	0.010	0.010	0.010	0.010	0.010

C - Cis Isomer

T - Trans Isomer

ND - No data available

NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1987

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated waste	Detection limits (ppm) K086 Samp.1	Detection limits (ppm) K086 Samp. 2-6
U044	Chloroform		0.010	0.005
U074	1,4-Dichloro-2-butene (T)		0.200	0.100
U076	1,1-Dichloroethane		0.010	0.005
U077	1,2-Dichloroethane		0.010	0.005
U078	1,1-Dichloroethylene		0.010	0.005
U079	1,2-Dichloroethylene (T)		0.010	0.005
U080	Methylene Chloride	[Untreated data	0.010	0.005
U083	1,2-Dichloropropane	is CBI]	0.010	0.005
U084	1,3-Dichloropropene (C)		0.010	0.005
U084	1,3-Dichloropropene (T)		0.010	0.005
U131	Hexachloroethane		0.010	0.010
U184	Pentachloroethane		ND	ND
U208	1,1,1,2-tetrachloroethane		0.010	0.005
U209	1,1,2,2-tetrachloroethane		0.010	0.005
U210	Tetrachloroethylene		0.010	0.005
U211	Carbon Tetrachloride		0.010	0.005
U226	1,1,1-Trichloroethane		0.010	0.005
U227	1,1,2-Trichloroethane		0.010	0.005
U228	Trichloroethylene		0.010	0.005
U243	Hexachloropropene		ND	ND

C - Cis Isomer
T - Trans Isomer
ND - No data available
CBI - Confidential Business Information

Source: USEPA 1987e
USEPA 1988c

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated waste	Detection limits (ppm) K087					
			Samp.1	Samp.2	Samp.3	Samp.4	Samp.5	Samp.6
U044	Chloroform	NP	0.005	0.005	0.005	0.005	0.005	0.005
U074	1,4-Dichloro-2-butene (T)	NP	0.100	0.100	0.100	0.100	0.100	0.100
U076	1,1-Dichloroethane	NP	0.005	0.005	0.005	0.005	0.005	0.005
U077	1,2-Dichloroethane	NP	0.005	0.005	0.005	0.005	0.005	0.005
U078	1,1-Dichloroethylene	NP	0.005	0.005	0.005	0.005	0.005	0.005
U079	1,2-Dichloroethylene (T)	NP	0.005	0.005	0.005	0.005	0.005	0.005
U080	Methylene Chloride	NP	0.005	0.005	0.005	0.005	0.005	0.005
U083	1,2-Dichloropropane	NP	0.005	0.005	0.005	0.005	0.005	0.005
U084	1,3-Dichloropropene (C)	NP	0.005	0.005	0.005	0.005	0.005	0.005
U084	1,3-Dichloropropene (T)	NP	0.005	0.005	0.005	0.005	0.005	0.005
U131	Hexachloroethane	NP	0.050	0.050	0.050	0.050	0.050	0.050
U184	Pentachloroethane	NP	0.010	0.010	0.010	0.010	0.010	0.010
U208	1,1,1,2-tetrachloroethane	NP	0.005	0.005	0.005	0.005	0.005	0.005
U209	1,1,2,2,-tetrachloroethane	NP	0.005	0.005	0.005	0.005	0.005	0.005
U210	Tetrachloroethylene	NP	0.005	0.005	0.005	0.005	0.005	0.005
U211	Carbon Tetrachloride	NP	0.005	0.005	0.005	0.005	0.005	0.005
U226	1,1,1-Trichloroethane	NP	0.005	0.005	0.005	0.005	0.005	0.005
U227	1,1,2-Trichloroethane	NP	0.005	0.005	0.005	0.005	0.005	0.005
U228	Trichloroethylene	NP	0.005	0.005	0.005	0.005	0.005	0.005
U243	Hexachloropropene	NP	ND	ND	ND	ND	ND	ND

C - Cis Isomer

T - Trans Isomer

ND - No data available

NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1986c

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated waste	Detection limits (ppm) K101			
			Samp.1	Samp.2	Samp.3	Samp.4
U044	Chloroform	NP	0.005	0.005	0.005	0.005
U074	1,4-Dichloro-2-butene (T)	NP	0.100	0.100	0.100	0.100
U076	1,1-Dichloroethane	NP	0.005	0.005	0.005	0.005
U077	1,2-Dichloroethane	NP	0.005	0.005	0.005	0.005
U078	1,1-Dichloroethylene	NP	0.005	0.005	0.005	0.005
U079	1,2-Dichloroethylene (T)	NP	0.005	0.005	0.005	0.005
U080	Methylene Chloride	NP	0.005	0.005	0.005	0.005
U083	1,2-Dichloropropane	NP	0.005	0.005	0.005	0.005
U084	1,3-Dichloropropene (C)	NP	0.005	0.005	0.005	0.005
U084	1,3-Dichloropropene (T)	NP	0.005	0.005	0.005	0.005
U131	Hexachloroethane	NP	0.010	0.010	0.010	0.010
U184	Pentachloroethane	NP	ND	ND	ND	ND
U208	1,1,1,2-tetrachloroethane	NP	0.005	0.005	0.005	0.005
U209	1,1,2,2-tetrachloroethane	NP	0.005	0.005	0.005	0.005
U210	Tetrachloroethylene	NP	0.005	0.005	0.005	0.005
U211	Carbon Tetrachloride	NP	0.005	0.005	0.005	0.005
U226	1,1,1-Trichloroethane	NP	0.005	0.005	0.005	0.005
U227	1,1,2-Trichloroethane	NP	0.005	0.005	0.005	0.005
U228	Trichloroethylene	NP	0.005	0.005	0.005	0.005
U243	Hexachloropropene	NP	ND	ND	ND	ND

C - Cis Isomer

T - Trans Isomer

ND - No data available

NP - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1988e
USEPA 1988n

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated waste	Detection limits (ppm) K102					
			Samp.1	Samp.2	Samp.3	Samp.4	Samp.5	Samp.6
U044	Chloroform	NF	0.005	0.005	0.005	0.005	0.005	0.005
U074	1,4-Dichloro-2-butene (T)	NF	0.100	0.100	0.100	0.100	0.100	0.100
U076	1,1-Dichloroethane	NF	0.005	0.005	0.005	0.005	0.005	0.005
U077	1,2-Dichloroethane	NF	0.005	0.005	0.005	0.005	0.005	0.005
U078	1,1-Dichloroethylene	NF	0.005	0.005	0.005	0.005	0.005	0.005
U079	1,2-Dichloroethylene (T)	NF	0.005	0.005	0.005	0.005	0.005	0.005
U080	Methylene Chloride	NF	0.005	0.005	0.005	0.005	0.005	0.005
U083	1,2-Dichloropropane	NF	0.005	0.005	0.005	0.005	0.005	0.005
U084	1,3-Dichloropropene (C)	NF	0.005	0.005	0.005	0.005	0.005	0.005
U084	1,3-Dichloropropene (T)	NF	0.005	0.005	0.005	0.005	0.005	0.005
U131	Hexachloroethane	NF	0.010	0.010	0.010	0.010	0.010	0.010
U184	Pentachloroethane	NF	ND	ND	ND	ND	ND	ND
U208	1,1,1,2-tetrachloroethane	NF	0.005	0.005	0.005	0.005	0.005	0.005
U209	1,1,2,2-tetrachloroethane	NF	0.005	0.005	0.005	0.005	0.005	0.005
U210	Tetrachloroethylene	NF	0.005	0.005	0.005	0.005	0.005	0.005
U211	Carbon Tetrachloride	NF	0.005	0.005	0.005	0.005	0.005	0.005
U226	1,1,1-Trichloroethane	NF	0.005	0.005	0.005	0.005	0.005	0.005
U227	1,1,2-Trichloroethane	NF	0.005	0.005	0.005	0.005	0.005	0.005
U228	Trichloroethylene	NF	0.005	0.005	0.005	0.005	0.005	0.005
U243	Hexachloropropene	NF	ND	ND	ND	ND	ND	ND

C - Cis Isomer

T - Trans Isomer

ND - No data available

NF - Either not present or not present in concentrations above the detection limit.

Source: USEPA 1988e
USEPA 1988n

Appendix A. (Continued)

Waste code	Constituent	Concentration of constituent in untreated waste		Detection limits (ppm) John Zink 1989 Pesticides Test Burn							
				Test 1				Test 2			
		Test 1	Test 2	Samp.1	Samp.2	Samp.3	Samp.4	Samp.1	Samp.2	Samp.3	Samp.4
U044	Chloroform										
U074	1,4-Dichloro-2-butene (T)										
U076	1,1-Dichloroethane										
U077	1,2-Dichloroethane										
U078	1,1-Dichloroethylene										
U079	1,2-Dichloroethylene (T)										
U080	Methylene Chloride	87,000.0		0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
U083	1,2-Dichloropropane										
U084	1,3-Dichloropropene (C)										
U084	1,3-Dichloropropene (T)										
U131	Hexachloroethane							0.010	0.010	0.010	0.010
U184	Pentachloroethane										
U208	1,1,1,2-tetrachloroethane										
U209	1,1,2,2-tetrachloroethane										
U210	Tetrachloroethylene	<0.010-<6,300						0.005	0.005	0.005	0.005
U211	Carbon Tetrachloride	0.017-140,000						0.005	0.005	0.005	0.005
U226	1,1,1-Trichloroethane	130,000		0.010	0.010	0.010	0.010				
U227	1,1,2-Trichloroethane										
U228	Trichloroethylene										
U243	Hexachloropropene										

C - Cis Isomer

T - Trans Isomer

Source: Onsite Engineering Report for John Zink Pesticides Test Burn
USEPA 1989b

APPENDIX B

Matrix Spike Recoveries* for: K019 Kiln Ash Residue
and Combustion Gas Scrubber Discharge Water

*All recovery values greater than 100 percent are considered as just 100 percent for the purpose of calculating accuracy-correction factors.

Appendix A Continued - Matrix Spike Recoveries for Kiln Ash Residue (K019)

Spike Constituent	Original amount found (ppb)	Sample Result			Duplicate Sample Result		
		Amount spiked (ppb)	Amount recovered (ppb)	Percent* recovery (%)	Amount spiked (ppb)	Amount recovered (ppb)	Percent* recovery %
VOLATILES							
4. Benzene	<2	25	22.6	90	25	21.2	85
7. Carbon Tetrachloride	**						
9. Chlorobenzene	<2	25	24.8	99	25	25	100
14. Chloroform	**						
22. 1,1,-Dichloroethane	**						
23. 1,2-Dichloroethane	**						
24. 1,1-Dichloroethylene	<2	25	21.2	85	25	19.4	78
42. Tetrachloroethene	**						
43. Toluene	**						
45. 1,1,1-Trichloroethane	**						

*Percent recovery = 100 x $(C_i - C_o)/C_t$, where C_i = amount recovered, C_o = original found, and C_t = amount spiked.

**No matrix spike was performed for this constituent. The percent recovery for this constituent is based on the lower average percent recovery of the volatile constituents. The lower average percent recovery is 90.75% from the duplicate sample result.

Source: USEPA 1988h

Appendix A Continued - Matrix Spike Recoveries for Kiln Ash Residue (K019)

Spike Constituent	Original amount found (ppb)	Sample Result: Amount spiked (ppb)	Sample Result: Amount recovered (ppb)	Sample Result: Percent* recovery (%)	Duplicate Sample Result: Amount spiked (ppb)	Duplicate Sample Result: Amount recovered (ppb)	Duplicate Sample Result: Percent* recovery %
VOLATILES (continued)							
47. Trichloroethene	<2	25	26.8	107 [a]	25	28	112 [a]
AVERAGE RECOVERY FOR VOLATILES				93.5			90.75
SEMIVOLATILES (BASE/NEUTRAL FRACTION)							
52. Acenaphthene	<2	50	55	110 [a]	50	55	110 [a]
68. Bis(2-chloroethyl)ether	+						
70. Bis(2-ethylhexyl) phthalate	+						
88. 1,4,-Dichlorobenzene	<2	50	45	90	50	49.5	99
98. Di-n-butylphthalate	+						
102. 2,4-Dinitrotoluene	<50	50	53.5	107 [a]	50	55	110 [a]
105. N-Nitroso-di-n-propylamine	<5	50	60	120 [a]	50	65	130 [a]

*Percent recovery = 100 x $(C_1 - C_o)/C_t$, where C_1 = amount recovered, C_o = original amount found, and C_t = amount spiked.

**No matrix spike was performed for this constituent. The percent recovery for this constituent is based on the lower average percent recovery of the volatile constituents. The lower average percent recovery is 90.75% from the duplicate sample result.

+No matrix spike was performed for this constituent. The percent recovery for this constituent is based on the lower average percent recovery of the semivolatile (base/neutral) constituents. The lower average percent recovery is 94.16 from the duplicate sample result.

[a]Recovery values greater than 100 percent were considered as just 100 percent.

Source: USEPA 1988h

Appendix A Continued - Matrix Spike Recoveries for Kiln Ash Residue (K019)

Spike Constituent	Original amount found (ppb)	Sample Result: Amount spiked (ppb)	Sample Result: Amount recovered (ppb)	Sample Result: Percent* recovery (%)	Duplicate Sample Result: Amount spiked (ppb)	Duplicate Sample Result: Amount recovered (ppb)	Duplicate Sample Result: Percent* recovery %
SEMIVOLATILES (continued)							
109. Fluorene	+						
110. Hexachlorobenzene	+						
113. Hexachloroethane	+						
121. Naphthalene	+						
136. Pentachlorobenzene	+						
141. Phenanthrene	+						
145. Pyrene	<2	50	60	120 [a]	50	46	92
148. 1,2,4,5-Tetrachlorobenzene	+						
150. 1,2,4-Trichlorobenzene	<5	50	37.5	75	50	40	80
AVERAGE RECOVERY FOR SEMIVOLATILES (BASE/NEUTRAL)				94.16			95.1

*Percent recovery = 100 x $(C_i - C_o)/C_t$, where C_i = amount recovered, C_o = original amount found, and C_t = amount spiked.

**No matrix spike was performed for this constituent. The percent recovery for this constituent is based on the lower average percent recovery of the volatile constituents. The lower average percent recovery is 90.75% from the duplicate sample result.

+No matrix spike was performed for this constituent. The percent recovery for this constituent is based on the lower average percent recovery of the semivolatile (base/neutral) constituents. The lower average percent recovery is 94.16% from the duplicate sample result.

[a]Recovery values greater than 100 percent were considered as just 100 percent.

Source: USEPA 1988h

Appendix A Continued - Matrix Spike Recoveries for Combustion Gas Scrubber Discharge Water (K019)

Spike Constituent	Original amount found (ppb)	Sample Result			Duplicate Sample Result		
		Amount spiked (ppb)	Amount recovered (ppb)	Percent* recovery (%)	Amount spiked (ppb)	Amount recovered (ppb)	Percent* recovery %
VOLATILES							
4. Benzene	<2	25	21	84	25	17	68
7. Carbon Tetrachloride	**						
9. Chlorobenzene	<2	25	29	116 [a]	25	23	92
14. Chloroform	**						
21. Dichlorodifluoromethane	**						
22. 1,1-Dichloroethane	**						
23. 1,2-Dichloroethane	**						
24. 1,1-Dichloroethylene	<2	25	12	48	25	11	44
42. Tetrachloroethene	**						
43. Toluene	**						

*Percent recovery = 100 x $(C_i - C_o)/C_t$, where C_i = amount recovered, C_o = original amount found, and C_t = amount spiked.

**No matrix spike was performed for this constituent. The percent recovery for this constituent is based on the lower average percent recovery of the volatile constituents. The lower average percent recovery is 76% from the duplicate sample result.

+No matrix spike was performed for this constituent. The percent recovery for this constituent is based on the lower average percent recovery of the semivolatile (base/neutral) constituents. The lower average percent recovery is 83.3% from the duplicate sample result.

[a]Recovery values greater than 100 percent were considered as just 100 percent.

Source: USEPA 1988h

Appendix A Continued - Matrix Spike Recoveries for Combustion Gas Scrubber Discharge Water (K019)

Spike Constituent	Original amount found (ppb)	Sample Result			Duplicate Sample Result		
		Amount spiked (ppb)	Amount recovered (ppb)	Percent* recovery (%)	Amount spiked (ppb)	Amount recovered (ppb)	Percent* recovery %
VOLATILES (continued)							
45. 1,1,1-Trichloroethane	**						
47. Trichloroethene	<2	25	21	84	25	27	108 [a]
AVERAGE PERCENT RECOVERY FOR VOLATILE				79			76
SEMIVOLATILES (Base/Neutral Fraction)							
52. Acenaphthene	<5	50	51	102 [a]	50	51	102 [a]
68. Bis(2-chloroethyl)ether	+						
88. 1,4-Dichlorobenzene	<2	50	34	68	50	35	70
98. Di-n-butylphthalate	+						
102. 2,4-Dinitrotoluene	<2	50	43	86	50	42	84
105. N-Nitroso-di-n-propylamine	<5	50	50	100 [a]	50	46	92 [a]

*Percent recovery = 100 x $(C_1 - C_o)/C_t$, where C_1 = amount recovered, C_o = original amount found, and C_t = amount spiked.

**No matrix spike was performed for this constituent. The percent recovery for this constituent is based on the lower average percent recovery of the volatile constituents. The lower average percent recovery is 76% from the duplicate sample result.

+No matrix spike was performed for this constituent. The percent recovery for this constituent is based on the lower average percent recovery of the semivolatile (base/neutral) constituents. The lower average percent recovery is 83.3% from the duplicate sample result.

[a]Recovery values greater than 100 percent were considered as just 100 percent.

Source: USEPA 1988h

Appendix A Continued - Matrix Spike Recoveries for Combustion Gas Scrubber Discharge Water (K019)

Spike Constituent	Original amount found (ppb)	Sample Result: Amount spiked (ppb)	Sample Result: Amount recovered (ppb)	Sample Result: Percent* recovery (%)	Duplicate Sample Result: Amount spiked (ppb)	Duplicate Sample Result: Amount recovered (ppb)	Duplicate Sample Result: Percent* recovery %
SEMIVOLATILES (continued)							
109. Fluorene	+						
110. Hexachlorobenzene	+						
113. Hexachloroethane	+						
121. Naphthalene	+						
136. Pentachlorobenzene	+						
141. Phenanthrene	+						
145. Pyrene	<2	50	43	86	50	43	86
148. 1,2,4,5-Tetrachlorobenzene	+						
150. 1,2,4-Trichlorobenzene	<10	50	30	60	50	34	68
AVERAGE PERCENT RECOVERY FOR SEMIVOLATILES (BASE/NEUTRALS)				83.3			83.3

*Percent recovery = 100 x $(C_i - C_o)/C_t$, where C_i = amount recovered, C_o = original amount found, and C_t = amount spiked.

**No matrix spike was performed for this constituent. The percent recovery for this constituent is based on the lower average percent recovery of the volatile constituents. The lower average percent recovery is 76% from the duplicate sample result.

+No matrix spike was performed for this constituent. The percent recovery for this constituent is based on the lower average percent recovery of the semivolatile (base/neutral) constituents. The lower average percent recovery is 83.3% from the duplicate sample result.

[a]Recovery values greater than 100 percent were considered as just 100 percent.

Source: USEPA 1988h